

MASTERY LEARNING INSTRUCTION VERSUS TRADITIONAL INSTRUCTIONAL
METHODS IN EIGHTH GRADE LANGUAGE ARTS

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INSTRUCTIONAL METHODS IN EIGHTH GRADE LANGUAGE ARTS

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MASTER OF SCIENCE

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ABSTRACT

The purpose of this study was to investigate the impact of mastery learning on eighth grade language arts students primarily in terms of academic gains, but subsidiary research questions also focused on the impact of mastery learning on student sense of self-efficacy in language arts, student attitudes towards learning language arts, and on student learning styles. This study focused on the grammar portions of language arts; it did not address the reading, writing, and speaking aspects. Results from this quasi-experimental study involved 43 eighth grade language arts students from a rural, relatively homogenous school in the Midwest. Over a four month time period, it was found that mastery learning does seem to have a statistically significant positive impact on student academic success, student sense of self-efficacy, and to some extent, student attitudes towards learning. However, no statistically significant impact was found for mastery learning on learning styles.

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CHAPTER 1. INTRODUCTION

Teachers face a challenge every day when they go to work because they must teach students with a variety of learning styles and abilities at the same time in the same classroom. Over the years, an array of theories and methods has been developed in an attempt to educate this diverse population in an effective manner. One such theory is mastery learning. According to Guskey (1980) mastery learning is built around the basic premise that all students are capable of learning the required material as long as they have enough time and good quality instruction, and until mastery is achieved, students do not move on to new topics. Unlike traditional instructional methods, which include rote instruction, teacher-driven time frames, and teaching to the middle performance level, mastery learning allows for differentiated instruction to take place (Eyre, 2007; Guskey, 2007; Kulik, Kulik, & Bangert-Drowns, 1990; McGuire & McDonald, 2009). This means that the students drive the learning time frame – slower for some, quicker for others. The instructor's role is instead to determine what is important for the student to learn, when they need to learn, and at what level mastery is obtained, such as 70% on a summative assessment (Diegelman-Parente, 2011). For those students that quickly reach mastery, engagement in enrichment activities provides them with challenges as well as a sense of ownership in their learning. Meanwhile, for those students that do not achieve initial mastery, a variety of instructional techniques, methods, and interventions are employed which may include additional instruction, worksheets, peer tutoring, or guided practice to help these students also reach mastery. The overall idea is that the gap between student achievement levels will decrease, while their understanding and sense of self-efficacy will increase.

Significance of Study

As classrooms become more and more inclusive, and various agencies increase the pressure on teachers to improve student performance, it is necessary to try to implement classroom instructional techniques that will help all students meet and master required educational standards. Traditional classroom instruction tends to teach to the middle ability students, leaving the lower ability students struggling to keep up, and the higher ability students bored and uninspired. Many standard interventions address one group or the other, usually by offering opportunities outside of the classroom for extra instruction or enrichment, but rarely all of the groups at the same time, in the same classroom on a daily basis. Mastery learning may offer an opportunity to do this. This study addresses middle school classrooms, which have largely been ignored by researchers.

Statement of the Problem

There is little current research on the influence of mastery learning on academic achievement for middle school students. The research that is available focuses primarily on college students and high school students. Because of the differences between these groups of students and middle school students, this research is of limited use in determining whether or not the implementation of mastery learning instruction in the middle school classrooms can reach students more effectively than traditional classroom instruction.

Research Questions

Primary Research Question

1. What impact does mastery learning have on the academic gains of eighth grade language arts students?

Subsidiary Research Questions

1. What impact does mastery learning have on student self-efficacy in language arts?
2. What impact does mastery learning have on student attitudes towards learning language arts?
3. What impact does mastery learning have on student learning styles?

CHAPTER 2. NEED OF THE RESEARCH

Research on mastery learning is necessary because classroom teachers continue to search for instructional techniques that will have a positive impact on learning for all types of student. As classrooms continue to become more diversified, teaching practices must also evolve. Although it may sometimes be necessary to develop new instructional strategies, it would seem remiss to ignore existing concepts. The ideas and concepts surrounding mastery learning have been around for decades, yet they remain relevant to today's educational challenges and may provide a solution to meeting student and teacher needs. Therefore, it is necessary to continue to study and develop mastery learning strategies for today's students, classrooms, and teachers. Without continued research into the efficacy of mastery learning in the classroom, a highly effective and enduring instructional philosophy may be lost, as well as time and energy wasted on reinventing what already exists.

The purpose of this study was to examine the impact of the mastery learning approach on academic gains for students in an 8th grade language arts course in comparison to academic gains for students in traditional classrooms as measured by Measures of Academic Progress (MAP) test results. Of subsidiary interest was the impact mastery learning has on student self-efficacy in language arts and on student attitudes towards learning language arts. This study focused on the grammar portions of language arts; it did not address the reading, writing, and speaking aspects. Attention will also be directed to how student learning style, surface or deep, was affected by mastery learning. These were assessed using questionnaires, teacher classroom observations, and student journal entries.

CHAPTER 3. REVIEW OF LITERATURE

The influences behind mastery learning stem back to the early 1920's when Washburne (1922) implemented the Winnetka Plan in Winnetka, IL, which focused on individualized instruction and promotion of students. A few years later, Morrison (1926) developed the "Morrison Plan" while at the University of Chicago which focused on student comprehension and the development of unit teaching, rather than traditional teaching methods. Over the years ideas changed and evolved, and in the mid 1960s the theory of mastery learning gained support from the education community.

One approach to mastery learning was proposed by Benjamin Bloom. Bloom developed a method of instruction with the goal of meeting the need for instructional differentiation as well as a flexible timeframe to help meet student needs. Bloom developed his theory in the mid-1960s after spending time observing teachers and students in classrooms. He proposed that educators needed to differentiate their instruction in order to successfully help all students learn, and that a majority of students could learn, they just needed adequate time to learn. In 1968 he introduced his instructional strategy called Learning For Mastery (LFM), a student-paced group-based learning method. In it he presented specific tenets necessary for teachers to implement it in their classrooms in terms of both instruction and assessment (Guskey, 2007). This method continues to elicit interest from educators and administrators decades later in trying to meet the pressures of the constantly changing world of education.

Schunk (2000) proposed that Bloom's model involved four different elements: defining mastery, planning for mastery, teaching for mastery, and grading for mastery (as cited in Zimmerman & DiBenedetto, 2008, p. 208). A standard of mastery is established prior to the implementation of instruction on the unit, usually a score of between 70% and 80% depending

on what the teacher decides (usually a “C” equivalent), and those students who attain that score are considered to have mastered the concept or skill. Teachers organize one to two week instructional units that have specific learning goals, and once completed, a brief, formative assessment is given which provides each student with feedback. Those that do not reach the defined mastery level on the initial formative assessment are provided with specific correctives based on the items they answered incorrectly.

Crijnen, Feehan, and Kellam (1998) and McGuire and McDonald (2009) found that there are many different facets of the mastery learning approach that lead to its effectiveness, not just one element. McGuire and McDonald (2009) explained that under the instructional strategies of mastery theory, students learn best when they are able to repeat a cycle of studying, testing, and feedback. This process continues until all students attain mastery and are ready to move on to the next concept. While the students who did not meet the mastery level work an additional day or two on corrective measures, the students that attained the mastery level engage in enrichment activities that are usually self-selected such as special projects, academic games, complex problem-solving tasks, or peer tutoring (Guskey, 2007). The students that are continuing to work towards mastery attempt another parallel formative assessment after the additional correctives are completed, and if mastery is attained, they move on to the enrichment activities, if not, additional instruction with the teacher or mastery level peers are given. Gentile (2004) felt that peer-tutoring should be a part of all mastery programs because only when a student has taught what they have learned to someone else did he feel that they would actually be cognizant of or apply their knowledge. This is yet another way that mastery learning helps improve student sense of self-efficacy and attitudes towards learning language arts.

In a meta-analysis of 108 controlled evaluations of mastery learning programs, Kulik et al. (1990) found that mastery learning had positive effects on academic achievement in students from elementary through college. Of the 108 studies, 72 used Fred S. Keller's Personalized System of Instruction (PSI) method for college-level teaching and 36 used Bloom's LFM method to teach first grade through college-level students. Of the 108 studies, 103 reported results from a final test given at the end of instruction, and all but seven reported positive effects for the mastery learning programs. Statistically significant results were reported in 67 of the 96 studies with an average of about 0.5 SD - enough to move students from the 50th to the 70th percentile. They also compared LFM and PSI results and found a slight difference in the average SD for the different methods. Results for the PSI tests showed that scores improved by an average of 0.48 SD, while LFM raised test scores by 0.59 SD. There were no reports of statistically significant negative results for any of the studies.

The mastery learning method does seem to have a positive academic affect on students, but Geeslin (1984) was interested in what the students that were taught using the LFM method thought of mastery learning. A group of 1,013 Kentucky students who had just completed several weeks of learning through the LFM model were asked to write or dictate an answer to the following prompt: "Write something about the unit. If you liked it, tell why; if you didn't like it, tell why you didn't" (Geeslin, 1984, p. 147). The investigator then read each response and categorized each as liked, disliked, or uncertain. Of the 1,013 students, 804 responded positively about LFM. Across all grades and all subject areas except one, students liked LFM, and the chi square that was produced was large enough that it could not be attributed to chance. The only students that did not approve of LFM were in the subject area of agriculture, and the researcher did not supply any feedback from those students to explain why. Zimmerman and Dibenedetto

(2008) also interviewed students after they had been or were currently being taught using mastery learning methods in math at a Tennessee high school. These students reported, “A high sense of confidence or self-efficacy for math, high self-evaluation with their progress, and high goal standards” (Zimmerman & DiBenedetto, 2008, p. 215). The additional benefits of mastery learning instruction include an improvement in self-efficacy and a change in the types of goals students set, which often carry over into other classrooms, even those not using the mastery method of instruction. A meta-analysis done by Guskey and Pigott (1998) on group-based mastery learning programs found that over the 46 studies they reviewed, mastery learning showed a positive impact on both student academic and affective learning results.

Although LFM appears to be a straightforward approach for helping reach all types of students in the classroom, some concerns have surfaced (Irons & Eppler, 2007; Lai & Biggs, 1994; and Livingston & Gentile, 1996). One area of concern has been that mastery learning impacts deep and surface learners differently. Biggs (1987) explained that deep learners have different motivations and strategies than surface learners do. For example, deep learners have an intrinsic desire to learn, and want to build knowledge in a subject area. They often seek to make connections to previous knowledge or apply it to real world situations. Surface learners are instead motivated to achieve an academic mark and work only to achieve that mark. They try to balance not doing enough while at the same time not doing more than is necessary. They do not learn to extend their knowledge or to gain competency. Instead they learn to meet an academic requirement. They want to simply memorize and identify, rather than explore and expand.

Lai and Biggs (1994) studied mastery learning using five grade nine biology classes. Three of the classes were taught using the LFM method, and two were used as control classes. They found that the mastery classes performed better than the control classes, and within those

mastery classes, those students with a bias towards surface learning approach did better than others. Looking only at comparing the members within the experimental group, Lai and Biggs (1984) used the Learning Process Questionnaire to measure learning biases. They found that those students with a surface learning bias were motivated to study when the LFM method was used, while it tended to diminish interest and performance in deep-learners. This is an area of concern because, although the goal is for all students to meet mastery, it is also important that all students are challenged and engaged. It is important that in striving for gains with those students that struggle, teachers do not lose students who quickly master new concepts.

Much like Ironsmith and Eppler (2007) and Lai and Biggs (1994), Kulik et al. (1990) found that the students that benefited the most from mastery learning were the low-aptitude students. Ironsmith and Eppler (2007) studied 576 undergraduate students using the PSI mastery method. Although the researchers found that all aptitude levels, low to high, in the control group achieved higher final test scores than the lecture students, the strongest effects were for the lowest GPA students. Although this finding was positive, there is concern that mastery learning may promote surface learning, which does not have long-term benefits for students in terms of analytical and cognitive skills.

Some researchers have found additional concerns with using mastery learning. Livingston and Gentile (1996) tested two variations of Bloom's decreasing variability hypothesis, which proposed that with mastery learning, the differences between slower and faster learners would decrease over successive units. This should mean that over time there should be a less variability among students, as well as in the correlation between aptitude and achievement on later units. However, Livingston and Gentile (1996) found that there is no evidence to support the two variations of Bloom's decreasing variability hypothesis. They instead found that

there appeared to be little change at all in the learning rate over the three to six units during which the students were exposed to the mastery learning method.

While Livingston and Gentile were concerned with some secondary hypotheses of Bloom, Martinez and Martinez (1999) were interested in determining if it was really the mastery learning positively impacting academic achievement, or the teacher utilizing the mastery learning method. Their study involved 80 students enrolled in one of four sections of a basic skills undergraduate mathematics class. The same excellent or master teacher, using the LFM method in two of the classes and the traditional method in the other two, taught all four sections. The researchers tracked teaching time per class and per student, which included time spent on preparing and grading tests, student meetings during office hours, and delivering corrective feedback. The researchers found no significant difference in student achievement on the final test across the mastery and traditional classes, but they did find that teacher time was nearly twice as much for the LFM classes. They proposed that it is the excellence of the teacher, not necessarily the use of the mastery method that leads to higher achievement results from the students. Their findings suggest that there may be a teacher-effect/procedural-effect confound.

Research has focused not only on the academic affects of mastery learning on academic success, but also on how it may affect student motivation. Changeiywo, Wambugu, and Wachanga (2011) focused on the effect of mastery learning on student motivation, particularly towards learning secondary school physics. They studied 161 Kenya students that were all taught the same course content, but the control group was taught using traditional methods while the experimental groups received instruction using the mastery learning method. The researchers were interested not only in motivation, but whether or not gender influenced motivation. They assessed this by having students completing the Students Motivation Questionnaire (SMOQ)

before and after the treatment effect. Although the results for gender were found to not be a significant influence on motivation to learn physics, the results did show that students in the mastery learning sections had significantly higher motivation than those taught using traditional methods.

Palardy (1993) proposed that although most research has shown that LFM positively affects student attitudes and achievement at all grade levels, the implementation of LFM may be challenging, and it is not well suited for all subject areas or units. However, LFM is not an all or nothing instructional strategy; in fact, it may function more effectively when paired with cooperative learning strategies. Krank and Moon (2001) were interested in comparing the success of mastery learning, cooperative learning, and a combined mastery/cooperative learning strategies on students' academic self-concepts and academic achievement outcomes. They used 104 undergraduate social science students enrolled in seven sections of a required upper level social science course. Students self-selected into all sections, and then the sections were randomly assigned to one of three teaching conditions: mastery learning, cooperative learning, or cooperative learning with a mastery learning element for individual, but not group, performance. The researchers used the Self Description Questionnaire III (SDQIII), which is used to measure 13 different areas of academic and non-academic self-concept, for a pretest and posttest measure of academic self-concept. There was no pretest measure was for academic achievement, only the final test scores were used to compare the three groups academically. Krank and Moon (2001) concluded that for undergraduate students the combined mastery/cooperative learning treatment produced a larger change in self-concept and higher course outcome achievement than either of the learning treatments alone.

Overall, the mastery learning theory, regardless of the method used to implement it, seems to be effective in improving student academic achievement, motivation, subject satisfaction, and academic self-concept. There are some confound concerns that the types of teachers that implement mastery learning methods are usually themselves exceptional teachers, making it hard to separate the method for the implementer. There are also concerns that mastery learning, while benefiting low-aptitude learner and surface learners, may actually have a negative effect on high-aptitude and deep learners. The classroom feedback from teachers also seems to imply that it may be necessary to develop a better implementation model for teachers to follow. However, the research findings seem to be overwhelmingly positive for the most part, and with proper implementation, mastery learning seems to be a legitimate answer to meeting the needs of nearly all students in the classroom effectively, especially when combined with other cooperative learning strategies.

CHAPTER 4. SCOPE OF STUDY AND LIMITATIONS

The research provided information on the impact of mastery learning in an eighth grade middle school English classroom. The focus of this study was narrow in that it only addressed the grammar elements of the language arts curriculum and not the reading or speaking aspects. This study included only eighth grade students at one school, and the student group was relatively homogeneous, which may make generalizing the results difficult. The number of students involved in the study is small at 43, but adequate to gather useful data. Because this was a quasi-experimental classroom study, there are also confounding variables that cannot be controlled for such as teacher expertise, student learning abilities, peer influences, socioeconomic factors, and parental involvement.

CHAPTER 5. METHODOLOGY

Purpose of Study

This quasi-experimental study focused primarily on the impact of mastery learning on student academic achievement. Additional subsidiary interests included the impact of mastery learning on student sense of self-efficacy in language arts, attitudes towards language arts, and learning styles in language arts. The independent variables for this study included measures of student self-efficacy, attitudes, and learning styles in language arts. This study focused on the grammar portions of language arts; it did not address the reading, writing, and speaking aspects. The dependent variable for all research questions was the introduction of mastery learning instruction in the classroom. The study started in October of 2012 and concluded in April of 2013, which coincided with quarters two and three of the middle school calendar. The intervention was completed at the end of quarter three in early March, but MAP testing was not conducted by the school until mid-April.

Research Questions

Primary Research Question

1. What impact does mastery learning have on the academic gains of eighth grade language arts students?

Subsidiary Research Questions

1. What impact does mastery learning have on student self-efficacy in language arts?
2. What impact does mastery learning have on student attitudes towards learning language arts?
3. What impact does mastery learning have on student learning styles?

Classrooms

Traditional Classroom

The traditional classroom involved a teacher-driven classroom, with the teacher determining the topic, the type of discussion, and the amount of time given for students on the assignment in class. Physically the classroom had desks in neat rows, facing the white board and the teacher podium. The teacher spent about 15 to 30 minutes of the class giving instruction which involved notes on the board that students were expected to record in their notebooks, examples from the book that the class and teacher went through together, as well as teacher generated examples on the board. The teacher randomly chose students to answer questions, usually from volunteers, but making sure that all students were called on. After the instruction time was over, the teacher handed out the assignment, which the students started to work on in class. The teacher walked around the room for a few minutes, but then students were encouraged to come to the teacher with questions or problems. The assignment was generally due the next day in class, and after the chapter from the book had been completed, a unit test was administered. Corrections were rarely allowed on papers or tests, and only occurred when students had obviously misunderstood the directions or the teacher felt the material needed to be covered again based on class performance.

Mastery Learning Classroom

The mastery learning classroom was the same as the traditional classroom in appearance, instructional material, and information that was presented. The teacher instruction timeframe, instruction, and post-instruction were the same as the traditional classroom. At the end of the unit, students received the same test as the traditional class. The test was corrected and returned the next instructional day, and based on a mastery level of 70% (the lowest “C”) on the test,

those students engaged in enrichment activities, such as computer based grammar games, analogy or critical thinking sheets, assisted with peer tutoring or completed the diagnostic preview for the next chapter. Meanwhile those students that had not met mastery met one-on-one or in a small group with the teacher to discuss the concept(s) that the students had struggled with. On the tests for the students that did not meet mastery, each section of material was broken down and graded for mastery, and then the students focused only on those elements for additional instruction. Because there are two whiteboards in the room, one in the front, and one in the back, it was possible for the additional instruction to take place at the rear of the classroom with boardwork and examples without disturbing the other students.

Once additional instruction had occurred, students were assigned individual assignments on just the concepts they had not reach mastery on. These assignments were due the next day at the beginning of the day during the students' homebase class period. This was a 15 minute time block that was part of the middle school schedule that was geared towards getting students organized for the day, reading, or completing homework. By having the additional assignments due at the beginning of the day, rather than waiting for class, it saved both the students and teacher valuable class time because the assignments could be reviewed before class. If students reached a mastery level grade on the assignment, and they were given a second unit exam that was parallel to, but different than the first exam, retesting only on the portion(s) of the exam that the student had not reached mastery on. If the student did not reach mastery on the first corrective assignment, students received additional one-on-one time with the teacher, before class when possible, or at the beginning of class. Sometimes students were able to do the additional correctives or take the test during their study hall, which again made the process move more quickly.

Once the student completed the second unit test, the teacher again corrected the test. If mastery was reached by all students at this point then the entire class moved on; if not, the mastery level students engaged in enrichment activities for an additional day while the non-mastery level students received one-on-one instruction from the teacher. This cycle continued for a total of three opportunities; at this point, those students not at the mastery level received additional instruction during homebase and study hall periods, but they and the class moved on to a new topic.

Participants

The study was carried out in three eighth grade language arts classrooms at Central Cass Middle School in Casselton, ND, a small, rural community. The potential pool consisted of 45 students. All but one student chose to participate in the study, and one student moved away before the study was completed so that data was removed, so 43 students completed the study. As summarized in Table 1, the study consisted of 43 students ranging in age from 13 to 15 years. They were relatively homogenous in terms of ethnicity, culture, and socioeconomic status, and all of the students spoke English.

Table 1

Student Gender and Age

Age	Male	Female	Total
13	2	4	6
14	20	16	36
15	1	0	1
Total	23	20	43

Three eighth grade language arts classrooms were used to conduct the study. Two of the classrooms served as intervention classrooms, with a total of 29 students starting the study and

28 completing the study. The remaining classroom served as the non-intervention classroom and consisted of 15 students.

Design

The primary focus of the study was the use of mastery instruction and its impact on student academic gains, with a subsidiary focus on student sense of self-efficacy in language arts, student attitude towards language arts, and student learning styles. Of the 43 students, 28 were taught using the mastery method and 15 were taught using the traditional method. The study was quasi-experimental using a mixed methods approach since the students were assigned to classrooms by the middle school principal, and then two of the classrooms were chosen to receive the intervention, and one continued with traditional classroom instruction. Researchers used quantitative and qualitative methods of gathering data from multiple sources regarding academic achievement, student self-efficacy, student learning style, and student attitude towards learning language arts. Descriptive statistics including the mean, N, standard deviation, and standard error mean were calculated for all measures. Pre- and post-intervention paired sample *t* tests were conducted on pre- and post- Map scores, the Biggs and the SMOQ questionnaires. The Cohen's D for effect size was calculated on those results which were significant.

Procedure

Random class assignment for students was not possible since students were assigned to classes based on class scheduling needs; however, the classroom treatments were assigned randomly. All procedures from the Institutional Research Board were followed regarding student and parental permission (see Appendix A). Questionnaires were completed by and data was collected from only those students that returned both the parental permission form and the student permission form. All students, whether included in the study or not, received the same

information, assessments, and interventions based on either traditional instructional methods or mastery learning methods.

MAP testing (see Appendix B) occurred in early October, which provided an academic baseline for all students before any change in instructional method was employed. This was a schoolwide achievement test, and the results were immediately reported to each student individually. Administration provided a summary report to the researcher within 24 hours of testing. After the MAP tests had been completed, students in the study completed the Biggs Revised Student Process Questionnaire R-SPQ-2F (see Appendix C), to establish a baseline for student learning styles (deep or shallow), and the Students' Motivation Questionnaire (SMOQ) (see Appendix D) to establish a baseline for student self-efficacy in language arts and student attitudes towards learning language arts. The student who did not participate in the study read during this time, since that is one of the options that homebase is used for.

After the fall MAP testing was completed, mastery learning instruction was introduced in two sections of the classes while the other section continued with traditional instruction. For the mastery learning groups this meant there was sometimes a day or two delay before the class moved on to a new topic. During that time mastery student engaged in enrichment activities while the non-mastery students engaged in reteaching, relearning, and retesting. A limit of three attempts at the mastery unit test was set, but if the student did not meet mastery during that time frame, the teacher did continue to instruct that student in one-on-one time that did not take classtime away from the other students.

All classes covered the same material, just the approach to learning was changed. Student journal responses were collected after completing each unit, and those responses were coded once the research time period had been completed. Each response was coded as positive,

negative, or neutral (neither positive or negative) by the same researcher for consistency.

Researcher observations during classtime were recorded once a month throughout the study regarding student engagement in the classroom, and these observations were coded as engaged or not engaged. For those students identified as not being engaged, a brief description was given.

MAP testing was administered again in mid-April, after which the same surveys used before the introduction of the mastery learning were administered to all participants. The posttest Biggs Questionnaire (R-SPQ-2F) asked the same questions to the non-intervention group and intervention groups as it did in the pretest; however, the posttest SMOQ, while remaining the same for the non-intervention group, specifically referred to language arts using the mastery learning approach in the questions for the intervention group. These questionnaires were the post measure used to assess the impact of mastery learning on student motivation, study processes, and sense of language arts self-efficacy.

Class quarterly grades were not used to measure academic achievement as originally discussed in the study's IRB due to the difficulty in controlling for all possible confounding variables in classroom instruction. Instead MAP test scores were used as the only measure of academic achievement since the environment in which they occurred was the same for nearly all students.

Instruments

MAP Test

MAP (Measures of Academic Progress) testing results from the fall were used as a baseline for student academic ability and then again in the spring to measure student growth. The MAP test was chosen because it is an existing academic test that all students are required to take by the school district, and is aligned the state standards. This computer-based academic

assessment tool has the ability to individualize itself to each student's performance based on student responses- a correct response leads to a more challenging question; an incorrect answer leads to a simpler one (Northwest Evaluation Association, 2013).

The results from the language arts portion of the test were utilized for this study. The test reports outcomes in terms of percentile, achievement scores, and growth scores, which are shown using the RIT scale (Rausch Unit). The RIT is an equal-interval scale used to track student understanding irrespective of grade level, which allows student progress to be tracked from year to year (Northwest Evaluation Association, 2013). The MAP test was used to assess student academic achievement.

Students' Motivation Questionnaire (SMOQ)

Students also completed the Students' Motivation Questionnaire (SMOQ), which was constructed based on Keller's ARCS motivation theory (Changeiywo et. al, 2011, p. 1339). According to John Keller (1987) four conditions that must exist for a learner to become and remain motivated are attention, relevance, confidence, and satisfaction; within those four factors, certain conditions and factors are important. Although the number of items under each category was given, the corresponding item numbers were not given so the researchers for the current study placed the items into the four categories based on Keller's definition of each of his conditions (see Appendix D).

The SMOQ was validated by Wachanga (2002) and Bunting, Coll & Campbell (2006) and modified to suit the study. The original questionnaire consisted of 28 items that were intended to measure student attitudes towards learning. There were eight questions each to assess relevance and confidence, seven to assess attention, and six for satisfaction, and these were answered using a 5-point Likert scale (1 = strongly and 5 = strongly agree). For this study,

two questions, numbers 22 and 23 (see Appendix E) were eliminated since they were not relevant to the study. The other changes made to the questionnaire were to change the subject being studied from physics to language arts, and for the pre-intervention questionnaire to change the wording from “mastery learning approach” to “traditional classroom approach” at the beginning of each series of questions. For the post-intervention survey, the questionnaire administered to the non-intervention group remained the same, but the wording was changed back to “mastery learning approach” for the intervention group at the beginning of each series of questions.

This survey was chosen by researchers because the language in it was appropriate for middle school students, and it was revised to measure student attitudes towards language arts and self-efficacy in language arts. Student attitudes towards learning and their sense of self-efficacy are strongly tied to academic success, so it is important to see if mastery learning can affect not only academic performance but also improve student attitudes towards learning and student sense of self-efficacy. If this happens, then it is much more likely that students will develop more positive attitudes and sense of self-efficacy towards learning across subject areas, moving the impact of mastery learning outside the mastery learning classroom into other classrooms regardless of instructional style.

Revised Study Process Questionnaire (R-SPQ-2F)

The students in the study completed the Biggs Revised Student Process Questionnaire (R-SPQ-2F), revised by Biggs, Kember, & Leung (2001), both pre- and post-intervention. This is a 20 question survey that assesses learning style and strategies, based on a surface or deep approach, across a 5-point likert scale (1 = never/rarely and 5 = Always/Almost Always). The R-SPQ-2F was validated by Immekus and Imbrie (2010), although they did have concerns that

some questions may be culturally sensitive. To make it easier for students to complete, the questionnaire's format was revised by the current researcher by placing answer choices under each question, rather than using the questions with the answer scale given once at the top and an opscan type sheet for answers. The Bigg's R-SPQ-2F was chosen for use because the language in it was appropriate for eighth grade students, and because it is a measure for how students study and the reasons they study. This is important, because one of the goals of mastery learning would be to promote deep learning (learning to gain knowledge about a topic for applications to the real world) and move away from surface learning (learn the information necessary to pass the test or complete the assignment), as well as to move students towards deep motivations (gain knowledge, desire to learn) for learning rather than surface motivations (receive a good grade, compete with other students in the class, fulfill the course requirements).

Other Materials

Students completed open-ended directed journal entries after the completion of each chapter. The three questions were as follows:

- 1) What did you learn in this unit?
- 2) How confident are you about what you learned?
- 3) How do you feel about learning language arts?

These journal entries were used to assess self-efficacy and attitude towards learning language arts as well as whether the learning goal for the unit had been accomplished. Teacher observations were recorded using a simple chart (See Appendix F) for assessing student engagement in the classroom at various times throughout the intervention to explore how classroom type (mastery or traditional) impacted student achievement. Students were identified

as being either engaged or not engaged, and if they were not engaged, a brief discription of the off-task behavior was included such as visiting, needing redirection, confusion etc.

CHAPTER 6. DATA COLLECTION AND ANALYSIS

Purpose of Study

The purpose of this study was to examine the impact of the mastery learning approach on academic gains for students in 8th grade language arts in comparison to academic gains for students in traditional classrooms as measured by MAP (Measures of Academic Progress) test results. Of subsidiary interest was the impact mastery learning has on student self-efficacy in language arts and on student attitudes towards learning language arts. Attention will also be directed to how student learning style, surface or deep, was affected by mastery learning. These were assessed using questionnaires, teacher classroom observations, and student journal entries.

Research Questions

Primary Research Question

1. What impact does mastery learning have on the academic gains of eighth grade language arts students?

Subsidiary Research Questions

1. What impact does mastery learning have on student self-efficacy in language arts?
2. What impact does mastery learning have on student attitudes towards learning language arts?
3. What impact does mastery learning have on student learning styles?

Students completed the MAP test, the SMOQ questionnaire, and the Biggs (R-SPQ-2F) questionnaire pre- and post-intervention. Any missing data was ignored so the *N* varied across measures. One student left the study before the study was completed, so that student's data was removed prior to running any statistically analyses. Descriptive statistics including the mean,

standard deviation, and standard error mean along with paired sample *t*-tests for both the intervention and non-intervention groups were run on the pre- and post data using SPSS Version 21. Cohen's D was calculated for those variables that reached significance to measure effect size.

MAP Results

The MAP test was administered by the school district to all of the eighth grade students in early October (pre) and again in mid-April (post). The purpose of using this data was to focus on academic growth for students from the fall to the spring. The MAP scores were analyzed using paired sample descriptive statistics as shown in Table 2 for the non-intervention group ($M_{fall} = 226.13$, $SD = 6.92$; $M_{spring} = 230.13$, $SD = 1.85$) and in Table 3 for the mastery learning group ($M_{fall} = 225.71$, $SD = 8.30$; $M_{spring} = 228.43$, $SD = 9.59$). The outcomes show that both groups of students experienced positive academic growth during the period of the mastery learning intervention.

Table 2

Non-Intervention Group Descriptive Statistics Pre- and Post-Intervention for the MAP Test

	Mean	N	Std. Deviation	Std. Error Mean
Fall MAP	226.13	15	6.917	1.786
Spring MAP	230.13	15	7.170	1.851

Table 3

Intervention Group Descriptive Statistics Pre- and Post-Intervention for MAP Test

	Mean	N	Std. Deviation	Std. Error Mean
Fall MAP	225.71	28	8.299	1.568
Spring MAP	228.43	28	9.589	1.812

A paired sample *t*-test with an alpha value of 0.05 was conducted to determine whether there was statistical significance between the pre- and post intervention means for both the non-intervention group (Table 4) and the mastery learning group (Table 5). The non-intervention group $t(14) = -2.02, p = .063$, did not differ significantly in its pre- and post- intervention mean scores. However, the mastery learning group $t(27) = -2.44, p = .021; d = -.36$ did show that MAP scores were affected significantly with a medium effect size by the introduction of mastery learning. Both groups showed positive increases in their mean MAP scores, but only the mastery learning group showed statistically significant results for improving academic achievement.

Table 4

Non-Intervention Group Paired Samples t-Test Pre- and Post-Intervention for the MAP test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference				
				Lower	Upper			
Fall MAP – Spring MAP	-4.000	7.663	1.978	-8.243	.243	-2.022	14	.063

Table 5

Intervention Group Paired Samples t-Test Pre- and Post-Intervention for the MAP Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference				
				Lower	Upper			
Fall MAP - Spring MAP	-2.714	5.881	1.111	-4.995	-.434	-2.442	27	.021

Student's Motivation Questionnaire (SMOQ) Results

The 26-question SMOQ used for this study was scored across four variables – attention (Attn), relevance (Rele), confidence (Conf), and satisfaction (Sat) - by the study's researchers based Keller's ARCS conditions according to his motivation theory (see Appendix E). A variable computation was done using the appropriate questions for each condition, and the resulting four variables were then analyzed using paired sample descriptive statistics as shown in for the non-intervention group in Table 6 and the intervention group in Table 7.

Table 6

Non-Intervention Group Descriptive Statistics Pre- and Post-Intervention for SMOQ Questionnaire

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Attn pre	19.3333	15	2.63674	.68080
	Attn post	17.3333	15	1.44749	.37374
Pair 2	Rele pre	21.2000	15	4.60124	1.18804
	Rele post	23.0667	15	2.60403	.67236
Pair 3	Conf pre	25.4000	15	4.86680	1.25660
	Conf post	24.8000	15	2.42605	.62640
Pair 4	Sat pre	20.5000	14	3.97589	1.06260
	Sat post	20.2857	14	3.09910	.82827

Note. Attn = Attention; Rele = Relevance; Conf = Confidence; Sat = Satisfaction; pre = pre-intervention; post = post-intervention

The attention variable ($M_{Attnpre} = 19.33$, $SD = 2.64$; $M_{Attnpost} = 17.33$, $SD = 1.45$), confidence variable ($M_{Confpre} = 25.40$, $SD = 4.87$; $M_{Confpost} = 24.80$; $SD = 2.43$), and the satisfaction variable ($M_{Satpre} = 20.50$, $SD = 3.98$; $M_{Satpost} = 20.29$, $SD = 3.10$) all showed decreases. The relevance variable ($M_{Relepre} = 21.20$, $SD = 4.60$; $M_{Relepost} = 23.07$, $SD = 2.60$) was the only one that showed an increase in its mean score for the non-intervention group.

Table 7

Intervention Group Descriptive Statistics Pre- and Post-Intervention for SMOQ Questionnaire

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Attn pre	18.8214	28	2.40453	.45441
	Attn post	17.5357	28	1.89506	.35813
Pair 2	Rele pre	19.3571	28	4.65247	.87923
	Rele post	22.1786	28	3.23240	.61087
Pair 3	Conf pre	23.4815	27	4.79078	.92199
	Conf post	23.9630	27	3.54619	.68247
Pair 4	Sat pre	18.6429	28	3.66378	.69239
	Sat post	19.5000	28	2.72845	.51563

Note. Attn = Attention; Rele = Relevance; Conf = Confidence; Sat = Satisfaction; pre = pre-intervention; post = post-intervention

The results from the intervention group also shows the attention variable mean decreased during the intervention period ($M_{Attnpre} = 18.82$, $SD = 2.40$; $M_{Attnpost} = 17.54$, $SD = 1.90$), but the relevance variable ($M_{Relepre} = 19.36$, $SD = 4.65$; $M_{Relepost} = 22.18$, $SD = 3.23$) confidence variable ($M_{Confpre} = 23.48$, $SD = 4.79$; $M_{Confpost} = 23.96$, $SD = 3.55$), and the satisfaction variable ($M_{Satpre} = 18.64$, $SD = 3.66$; $M_{Satpost} = 19.5$, $SD = 2.73$) all showed increases in their mean scores during the intervention period.

A paired sample *t*-test with an alpha value of 0.05 was used to determine whether there was statistical significance between the pre- and post interventions for both the non-intervention group (Table 8) and the intervention group (Table 9) on the same variables. The outcomes were examined to ascertain what impact mastery learning had on student self-efficacy in and attitudes towards learning language arts.

The non-intervention group $t_{attn}(14) = 2.60$, $p = .021$; $d = .88$ showed a significant change with a large effect size for the student attention variable. However, for $t_{rele}(14) = -1.56$, $p = .140$; $t_{conf}(14) = .62$, $p = .546$; $t_{sat}(13) = .26$, $p = .803$, the variables did not differ significantly in their pre- and post- intervention scores.

Table 8

Non-Intervention Group Paired Samples t-Test Pre- and Post-Intervention for SMOQ Questionnaire

	Paired Differences							
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Attn pre – Attn post	2.00000	2.97610	.76842	.35189	3.64811	2.603	14	.021
Rele pre – Rele post	-1.86667	4.62704	1.19470	-4.42904	.69570	-1.562	14	.140
Conf pre – Conf post	.60000	3.75690	.97003	-1.48050	2.68050	.619	14	.546
Sat pre -Sat post	.21429	3.14223	.83980	-1.59999	2.02856	.255	13	.803

Note. Attn = Attention; Rele = Relevance; Conf = Confidence; Sat = Satisfaction; pre = pre-intervention; post = post-intervention

Table 9

Intervention Group Paired Samples t-Test Pre- and Post-Intervention for SMOQ Questionnaire

	Paired Differences						Sig. (2-tailed)	
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t		df
				Lower	Upper			
Attn pre – Attn post	1.28571	2.71971	.51398	.23112	2.34031	2.502	27	.019
Rele pre – Rele post	-2.82143	4.66709	.88200	-4.63114	-1.01172	-3.199	27	.004
Con pre – Con post	-.48148	4.20046	.80838	-2.14313	1.18017	-.596	26	.557
Sat pre – Sat post	-.85714	3.13539	.59253	-2.07292	.35864	-1.447	27	.160

Note. Attn = Attention; Rele = Relevance; Conf = Confidence; Sat = Satisfaction; pre = pre-intervention; post = post-intervention

The intervention group showed a significant change for the student attention variable $t_{attn}(27) = 2.50, p = .019; d = .88$ with a large effect size, and the relevance variable $t_{rele}(27) = -3.20, p = .004; d = -.82$, which also had a large effect size. However, the confidence variable $t_{conf}(26) = -.60, p = .557$; and satisfaction variable $t_{sat}(27) = -1.45, p = .160$ did non-statistically significantly in their pre- and post- intervention scores.

Bigg's Revised Study Process Questionnaire (R-SPQ-2F) Results

The Bigg's questionnaire, following the developer's scoring instructions, was scored across four learning styles: Deep Motive (DM), Deep Strategy (DS), Surface Motive (SM), and Surface Strategy (SS). A variable computation was done using the appropriate questions for each style as provided by the developer. Those four variables were then analyzed using paired sample descriptive statistics as shown in Table 10 for the non-intervention group, and Table 11 for the intervention group.

Table 10

Non-Intervention Group Descriptive Statistics Pre- and Post-Intervention for Bigg's R-SPQ-2F Questionnaire

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	DM pre	11.6000	15	2.92282	.75467
	DM post	13.2000	15	4.07431	1.05198
Pair 2	DS pre	12.4667	15	3.37780	.87214
	DS post	12.4000	15	3.31231	.85524
Pair 3	SM pre	12.0667	15	3.73146	.96346
	SM post	12.3333	15	4.56175	1.17784
Pair 4	SS pre	15.5000	14	2.90225	.77566
	SS post	14.9286	14	3.26907	.87370

Note. DM = Deep Motive; DS = Deep Strategy; SM = Surface Motive; SS = Surface Strategy; pre = pre-intervention; post = post-intervention

Table 10 shows a positive increase in the means for the non-intervention group on the deep motivation variable ($M_{DMpre} = 11.60, SD = 2.92; M_{DMpost} = 13.20, SD = 4.07$), as well as for

the surface motivation variable ($M_{SMpre} = 12.07$, $SD = 3.73$; $M_{SMpost} = 12.33$, $SD = 4.56$).

However, minimal decreases occurred for the deep strategy ($M_{DSpre} = 12.47$, $SD = 3.38$; $M_{DSpost} = 12.40$, $SD = 3.31$) and surface strategy variables ($M_{SSpre} = 15.50$, $SD = 2.90$; $M_{SSpost} = 14.93$, $SD = 3.27$).

Table 11

Intervention Group Descriptive Statistics Pre- and Post-Intervention for Bigg's R-SPQ-2F Questionnaire

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	DM pre	11.1071	28	3.76474	.71147
	DM post	11.8929	28	4.75581	.89876
Pair 2	DS pre	10.9231	26	3.47474	.68145
	DS post	12.2692	26	4.52157	.88675
Pair 3	SM pre	12.4286	28	4.65418	.87956
	SM post	12.5357	28	4.91771	.92936
Pair 4	SS pre	14.1429	28	2.70410	.51103
	SS post	14.3214	28	3.43245	.64867

Note. DM = Deep Motive; DS = Deep Strategy; SM = Surface Motive; SS = Surface Strategy; pre = pre-intervention; post = post-intervention

Table 11 shows that for the intervention group there were mean gains across all variables, with the largest gain being in the deep strategy variable ($M_{DSpre} = 10.92$, $SD = 3.48$; $M_{DSpost} = 12.27$, $SD = 4.52$). There was also an increase in the mean for the deep motivation variable ($M_{DMpre} = 11.11$, $SD = 3.77$; $M_{DMpost} = 11.89$, $SD = 4.76$), the surface motivation variable, ($M_{SMpre} = 12.43$, $SD = 4.65$; $M_{SMpost} = 12.54$; $SD = 4.92$), and the surface strategy variable ($M_{SSpre} = 14.14$, $SD = 2.70$; $M_{SSpost} = 14.32$, $SD = 3.43$), although these increases were minimal.

A paired sample *t*-test with an alpha value of 0.05 was used to determine whether there was statistical significance between the pre- and post interventions for both the non-intervention group (Table 12) and the intervention group (Table 13) on the same variables. These results were analyzed to see if the intervention had an impact on student learning styles.

Table 12

Non-Intervention Group Paired Samples t-Test Pre- and Post-Intervention for Bigg's R-SPQ-2F Questionnaire

	Paired Differences						Sig. (2- tailed)	
	Mean	Std. Deviation	Std. Error	95% Confidence		t		
				Interval of the				
				Lower	Upper			
DM pre – DM post	-1.60000	3.96052	1.02260	-3.79326	.59326	-1.565	14	.140
DS pre – DS post	.06667	2.81493	.72681	-1.49219	1.62552	.092	14	.928
SM pre – SM post	-.26667	4.13118	1.06667	-2.55444	2.02111	-.250	14	.806
SS pre – SS post	.57143	4.14570	1.10798	-1.82223	2.96508	.516	13	.615

Note. DM = Deep Motive; DS = Deep Strategy; SM = Surface Motive; SS = Surface Strategy; pre = pre-intervention; post = post-intervention

Table 13

Intervention Group Paired Samples t-Test Pre- and Post-Intervention for Bigg's R-SPQ-2F Questionnaire

	Paired Differences						Sig. (2- tailed)	
	Mean	Std. Devia- tion	Std. Error Mean	95% Confidence Interval of the Difference		t		
				Lower	Upper			
DM pre – DM post	-.78571	4.28051	.80894	-2.44552	.87409	-.971	27	.340
DS pre – DS post	-1.34615	3.80465	.74615	-2.88289	.19058	-1.804	25	.083
SM pre – SM post	-.10714	3.86187	.72982	-1.60462	1.39033	-.147	27	.884
SS pre – SS post	-.17857	3.55958	.67270	-1.55883	1.20169	-.265	27	.793

Note. DM = Deep Motive; DS = Deep Strategy; SM = Surface Motive; SS = Surface Strategy; pre = pre-intervention; post = post-intervention

The non-intervention group results showed $t_{DM}(14) = -1.57, p = .140$; $t_{DS}(14) = .09, p = .928$; $t_{SM}(14) = -.25, p = .806$; $t_{SS}(13) = .52, p = .615$ were non-statistically significant in its pre- and post- intervention scores across all of the learning style variables. Results for the intervention group across all four variables found $t_{DM}(27) = -.97, p = .340$; $t_{DS}(25) = -1.80, p = .083$; $t_{SM}(27) = -.15, p = .884$; $t_{SS}(27) = -.27, p = .793$ were not statistically significantly across

pre- and post- intervention scores across all of the learning style variables. For both groups of students there were no statistically significant results for changes in student learning styles.

CHAPTER 7. SUMMARY AND CONCLUSIONS

The goal of this study was to examine the impact of mastery learning used as an instructional strategy, specifically with eighth grade language arts students. The study was important in that it focused on eighth grade middle school students, while a majority of previous research has primarily studied secondary and tertiary students. The scope of the study also dealt with more than just academic strides since the goal of modern day education is to promote curiosity, critical thinking, and self-motivation in students. This study focused on examining the following aspects of the impact of mastery learning on students:

Primary Research Question

1. What impact does mastery learning have on the academic gains of eighth grade language arts students?

Subsidiary Research Questions

1. What impact does mastery learning have on student self-efficacy in language arts?
2. What impact does mastery learning have on student attitudes towards learning language arts?
3. What impact does mastery learning have on student learning styles?

Primary Research Question: What Impact Does Mastery Learning Have on the Academic Gains of Eighth Grade Language Arts Students?

Results from the paired sample *t*-tests on the fall and spring MAP scores showed that there were non-statistically significant findings for the traditional (non-intervention) group on academic achievement. The results for the mastery learning (intervention) group for academic achievement were statistically significant with a medium effect size on improving these scores.

These results, to some extent, help negate some of the possible confounding variables that cannot be controlled for in a quasi-experimental study. Since the same teacher presented the same material in the same classroom in a similar time-frame with different academic results, it would seem that the mastery learning had the impact rather than extraneous confounding variables. Although the traditional learning group made improvements in their academic achievement scores ($M_{fall} = 226.13$, $SD = 6.92$; $M_{spring} = 230.13$, $SD = 18.51$), they did not have enough growth to reach statistical significance, indicating that the improvement in the academic achievement scores that was statistically significant for the mastery learning group $t(27) = -2.44$, $p = .021$; $d = -.36$ can be attributed to the use of mastery learning in the classroom.

Subsidiary Research Question 1: What Impact Does Mastery Learning Have on Student Self-Efficacy in Language Arts?

The SMOQ was used to measure student sense of self-efficacy in language arts. Of the four different variables being measured in the SMOQ, it seemed logical, based on Keller's theory, to focus on the confidence variable as a measure of self-efficacy. The traditional group showed a decrease in confidence based on the pre- and post-intervention mean scores, ($M_{Confpre} = 25.40$, $SD = 4.87$; $M_{Confpost} = 24.80$; $SD = 2.43$), while the intervention group showed a small increase ($M_{Confpre} = 23.48$, $SD = 4.79$; $M_{Confpost} = 23.96$; $SD = 3.55$). The results from the t -test found non-statistically significant results for both the traditional group ($t_{conf}(14) = .62$, $p = .546$) and the mastery learning group ($t_{conf}(26) = -.60$, $p = .557$). What this seems to indicate is that although mastery learning has no statistically significant effect on student sense of self-efficacy, the small increase in self-efficacy of the mastery learning group is better than the small decrease in self-efficacy for the traditional group. This may not be enough of a benefit to change over to mastery learning from traditional learning if this were the only factor being considered.

In addition to the SMOQ questionnaire, students completed a journal entry at the end of each unit asking how confident he or she felt about learning language arts. These entries were grouped in categories as follows: very confident, confident, somewhat confident, and not confident. The traditional learning group seemed to maintain their confidence level over the units that were covered, regardless of what level they started at. With the mastery learning group, there seemed to be a more dramatic shifts up and down in confidence, although for the most part it seemed that student responses became more positive as the units progressed. There was one unit that the confidence level dipped for several students in both groups, some all the way from being very confident in the chapter before to not confident in the current chapter, but then rebounded with the next chapter. This indicates that the difficulty of the concepts being covered may have a stronger impact than the type of instructional style used, as shown by the lower confidence level for many students across both groups on the one unit.

Subsidiary Research Question 2: What Impact Does Mastery Learning Have on Student Attitudes Towards Learning Language Arts?

The SMOQ was also utilized to measure student attitudes towards learning language arts. Based on Keller's definitions of the four conditions the must exist for students to be motivated to learn, it seemed that all four variable should be considered. After considering the overall results from the SMOQ, it seemed important to look at the results on each individual variable. Both the traditional group ($t_{attn}(14) = 2.60, p = .021; d = .88$) and the control group ($t_{attn}(27) = 2.50, p = .019; d = .88$) showed a level of negative growth between the pre- and post-intervention data on the attention variable that met statistical significant with a large effect size. Because the groups had similar results with identical effects size, it was difficult to attribute the loss on the attention variable to the introduction of mastery learning, instead this may have been due to the teacher or

some other confounding variable. These potential confounds could be controlled for in future studies on mastery learning versus traditional learning by having multiple teachers of the same grade in the same subject area conduct the same intervention, although while trying to control for one confound, this may actually introduce more confounds.

For the relevance variable, the traditional learning group did not show statistically significant growth, but the mastery learning group did ($t_{rele}(27) = -3.20, p = .004; d = -.82$) with a large effect size. This indicates that the use of mastery learning in the classroom does lead to an improved attitude towards learning language arts in terms of relevance. What this would seem to indicate is that mastery learning makes the students feel that the information they are being required to learn in language arts is relevant to something beyond the classroom and will be applicable outside the classroom. This in turn seems to lead to more positive attitudes towards learning language arts.

Neither the traditional learning group nor the mastery learning group reached statistical significance on either the confidence or the satisfaction variable. It does seem worth noting that although statistical significance was not reached, the means for the traditional group on three of the four variables (attention, confidence, and satisfaction) showed small decreases, while for the mastery learning group, three of the four variables (relevance, confidence, and satisfaction) showed positive growth on the pre- and post-intervention means. This would seem to indicate that mastery learning does appear to have a more positive impact on student attitudes towards learning language arts than traditional classroom instruction. The fact that neither type of instruction had a positive impact on the student attention variable may indicate that this is an area where the instructor can focus on for future growth.

Each student also completed a journal question at the end of each unit asking how he or she felt about learning language arts. These responses were then grouped into categories of positive, negative, or neutral responses. The traditional group had an overall positive attitude towards learning language arts. Within this group, the level of confidence on what they had learned did not seem to impact their attitude towards learning language arts. One student that did well in the class repeatedly stated, “I like learning language arts,” but often reported a confidence level of somewhat or okay, showing that grades are not always an indication confidence level, and confidence does not always impact attitude.

The mastery learning group it seemed that for students that struggled, their attitudes improved as they progressed through the chapters. One student in particular wrote on the first week of feedback, “I HATE IT!!”, but by the end was reporting feeling “Good” about learning language arts. Most students that had a positive attitude at the beginning maintained it throughout the intervention, and for the neutral students, students tended to responded more favorably towards the end.

Students from both groups noted in particular that they liked being able to work ahead and that it was more fun that way. One student in the mastery group consistently responded that language arts was, “Okay but boring,” until the chapter that the students were allowed to work ahead. Thereafter the student was very positive and said, “I like it when we go faster rather than slower, I like the packets.” A student from the traditional group also noted on the same chapter that, “It’s fun when we can work ahead.” Before that the student had responded, “Language arts is OK, but it’s not my favorite,” or just, “It’s OK.”

Overall, the impact of mastery learning on student’s attitudes towards learning language arts does seem to be positive, thereby indicating that its implementation in the classroom should

lead to an improvement in student attitudes towards language arts and would be worth implementing to help meet this goal.

Subsidiary Question 3: What Impact Does Mastery Learning Have on Student Learning Styles?

Another goal of mastery learning is to promote deep learning and to move students away from surface learning. The Biggs Revised Study Process Questionnaire (R-SPQ-2F) was used to measure the impact of mastery learning on student learning styles across four variables: deep motive, deep strategy, surface motive and surface strategy. The traditional group did show positive mean increases on both types of motivation (deep and surface), and mean decreases for both strategy variables (deep and surface). In contrast, the mastery learning group showed positive mean growth across all four variables. However, neither the non-intervention group nor the mastery learning group showed statistically significant growth on any of the four student learning styles. These results would seem to imply that mastery learning does not seem to have an impact on student learning styles, so it would not be effective to implement mastery learning in the classroom if this were the primary goal unless partnered with other instructional strategies.

Limitations

There are limitations to this study. First, the time period of the intervention was short, only about four months, and it is difficult to affect and measure real change in that short of a timeframe. Secondly, this was the first time I had implemented mastery learning, so the effects might have been stronger if I had been experienced at implementing the program. Another limitation for this study was the small with $N = 43$, and relatively homogeneity of the participants in nature. Both of these aspects making it difficult to generalize the findings to the general population. In addition, this study was conducted in one school with the same instructor, making it hard to control for confounds such as classroom environment, materials used, and

teacher expertise. I also chose to focus on only the grammar portion of language arts, not the reading, speaking, or writing portions since it provided less subjective work, therefore making it difficult to imply that mastery learning would affect all areas that fall under language arts the same way. Finally, because this was a quasi-experimental study, it is not possible to control for all the confounding variables that exist in a classroom setting, making it difficult to determine the definitive impact mastery learning had on student learning.

Impact on Current Practice

The results of this study will impact my current practices in a variety of ways. First, there is value in implementing mastery learning, at least to some degree, with all types of students. For those students that struggle are not motivated in school, the impact is most noticeable. I found that instead of being resistant to additional practice work and one-on-one instruction, most of those students were quick to comply with the requests and often were able to make significant positive progress after just one short intervention. There were occasions when a student or two simply was unable to meet the mastery level after several interventions and retests, but I found instead of not moving forward at all, that while moving forward with new instruction, I would simply require that student to continue to work on the challenging concept and the understanding would come. Additionally, I found that for those students that quickly reach mastery, the idea of allowing them to engage in a self-paced, self-monitored learning was quickly embraced by them, and that I did not have to worry about them being off-task while I worked with the other students.

Secondly, I had expected the introduction of mastery learning in my classroom to be more overwhelming and time consuming than it was. Since this was the first time I had engaged in the practice of using mastery learning instruction, there was a steep learning curve at first.

One of the first challenges was finding parallel assessments, but I quickly found that since most test have at least 50 questions on them, I simply used the odds for the first assessment and the evens for the second assessment in most cases. This did require me to examine the tests more carefully to make sure all of the concepts were covered, but once it was done the first time, it will be much simpler in the future.

I also found that I hadn't been utilizing all of the resources that came with my textbook, so I had additional correctives and instructional material already created that I could easily access for the students still working to reach mastery. I did determine that it was important to examine where students struggled in the initial assessment and then only to focus on those variables. If the students only struggled on one part of the test, I only retested them on that part with the second assessment. A bigger challenge was finding appropriate enrichment activities that could be done in for a short time frame, but the use of peer tutoring and online activities answered this challenge.

There were some schedule changes that I found I had to make to my classroom. First, it became obvious that it was important to administer the formative assessments on Fridays so that they could all be corrected and the appropriate areas focused on for those students that had not met mastery the following Monday. If the formative assessments were done in the middle of the week, it was much more difficult to organize feedback, instruction, and enrichment in less than 24 hours. Next, it became clear that the amount of time needed for additional instruction was smaller than what I had anticipated, usually around 15 minutes or less, so more in-depth enrichment activities were hard to implement. Peer tutoring and online activities became the most likely activities for the mastery level students to engage in, rather than opportunities that

might have led to the development of deeper learning such as real world activities and interest based research activities.

One factor that came to light in terms of my actual teaching was that I needed to improve on getting my student's attention and maintaining it. Several ideas given by Keller for simple ways to engage and maintain students attention such as a loud whistle, upside down words on the board, etc., might improve this variable, which was negative for both the non-intervention group and the mastery learning group. This may indicate it may have been an area of weakness for me as the instructor, rather than the method of instruction that led to the lack of attention or interest in the subject. Implementing some of these ideas will be another adjustment I will make in my instructional practices.

The only unexpected challenge that I found with the mastery learning was how to handle those students that did not meet mastery and had attendance issues. Often one is related to the other, and the idea of holding up the entire class for a student that is not there to receive the instruction can seem pointless. Other times, an extended illness can cause issues because the priority becomes to catch the student up, and sometimes that is hard to balance with the rest of the class. Again, some flexibility needs to exist, as well as the recognition that sometimes it is not the concept being taught that is the challenge, but the lack of attendance when it is being taught.

Finally, it became apparent that I had to set a limit to how much time was spent trying to meet mastery with a student, especially when all other students are ready to move on. Sometimes the struggling learner gets frustrated and seems to create a mental block, so to remove the pressure, moving on is sometimes better. By revisiting the concept, either through one-on-one instruction outside of class, using peer tutors, or simply revisiting difficult concepts

repeatedly throughout the year, the challenging topic is not abandoned, but instead, it is examined in a variety of ways. The moment of understanding for that student may come two weeks later when working on another concept that has built on the one they were struggling with instead of within the original context. Some flexibility must exist in the implementation of mastery learning so that all students benefit from instruction, as well as making sure that students are moving forward in the educational process.

CHAPTER 8. SCOPE FOR FURTHER RESEARCH

Future Research

A few of the limitations of this study included the study size, the use of only one teacher, and the used of one school, all making it difficult to generalize to other populations. Future research should try to include a variety of locations, preferably from different areas, classrooms, and teachers. The challenge in doing this is finding teachers willing to participate in the study and implement mastery learning in their classroom. Adding additional locations would also increase the size of the population as well as the make it less homogeneous depending on the characteristics of the population.

Another challenge that may have affected the outcome of the study was the short length of the intervention. Due to the need to establish baseline data with both the teacher and the students before the mastery learning intervention, it is difficult to make the time period of intervention longer, although in this case it would have been possible to add another six weeks of intervention by using the timeframe of the MAP testing rather than quarter breaks as a start and stop time for data collection. Future research should look at the impact of mastery learning over a longer timeframe.

Future research needs to continue to focus on the use of mastery learning in the middle school classrooms since the research done with this student age group is limited. Because middle school students are their own unique population, mastery learning may impact them in ways that have very beneficial outcomes for how they learn in the future, that are not found with high school students and college students. It also is important that a variety of subject areas are studied because the mastery learning method may not be appropriate for all subject areas, especially those classes where grades are more subjective in nature.

Final Conclusion

Overall the impact of mastery learning seems to indicate positive outcomes for students. There are some areas, such as learning style, that seem less affected by mastery learning, but in the areas of achievement, student self-efficacy, and student attitudes towards learning positive gains were found. Mastery learning offers a viable, existing option for teachers to implement in their classrooms that will assist them in meeting the pressures of teaching a more and more diverse classroom population, while helping all students perform academically in a manner that prepares them to enter the adult world.

REFERENCES

- Biggs, J. B., & Australian Council for Educational Research, H. n. (1987). *Learning Process Questionnaire Manual. Student Approaches to Learning and Studying*.
- Biggs, J., Kember, D., & Leung, D.Y.P. (2001, March). The revised two factor study process questionnaire: R-SPQ-2F. *British Journal of Educational Psychology*, 71(1), 133-149.
Retrieved from <http://web.ebscohost.com.proxy.library.ndsu.edu/ehost/pdfviewer/pdfviewer?sid=1d52bb98-2379-4866-8051-ef7aacd50422%40sessionmgr110&vid=5&hid=121>
- Bunting, C., Coll, R. K., & Campbell, A. (2006, December). Student views of concept mapping use in introductory tertiary biology classes. *International Journal of Science and Mathematics Education*, 4(4), 641-688. Retrieved from <http://ejournals.ebsco.com/Direct.asp?AccessToken=46T6PYB8K512PLCPEBE559BE2Y6C895B6&Show=Object>
- Changeiywo, J. M., Wambugu, P. W., & Wachanga, S. W. (2011, December). Investigations of students' motivation towards learning secondary school physics through mastery learning approach. *International Journal of Science and Mathematics Education*, 9(6), 1333-1350. Retrieved from <http://ejournals.ebsco.com.proxy.library.ndsu.edu/Direct.asp?AccessToken=95JQQIQ8XQRX9JEIDIEU4JZ4E1Z48QMJ5&Show=Object&ErrorURL=http%3A%2F%2Flinksource%2Eebsco%2Ecom%2Ferror%2Easpx>
- Crijnen, A. M., Feehan, M., & Kellam, S. G. (1998). The course of malleability of reading achievement in elementary school: The application of growth curve modeling in the evaluation of a mastery learning intervention. *Learning & Individual Difference*, 10(2), 137-158. Retrieved from <http://web.ebscohost.com.proxy.library.ndsu.edu/ehost/detail>

?vid=10&sid=ab1cf928-5e22-47e5-9a7b-3cd6ee01e5b1%40sessionmgr114&hid=124&bdata=JnNpdGU9ZWhvc3QtbGl2ZSZzY29wZT1zaXRl#db=aph&AN=1616245

Diegelman-Parente, A. (2011, May). The use of mastery learning with competency-based grading in an organic chemistry course. *Journal of College Science Teaching*, 40(5), 50-58. Retrieved from http://ic.galegroup.com.proxy.library.ndsu.edu/ic/suic/AcademicJournalsDetailsPage/AcademicJournalsDetailsWindow?failOverType=&query=&prodId=SUIC&>windowstate=normal&contentModules=&mode=view&displayGroupName=Journals&limiter=&currPage=&disableHighlighting=false&displayGroups=&sortBy=&source=&search_within_results=&action=e&catId=&activityType=&scanId=&documentId=GALE%7CA270896169

Eyre, H. L. (2007). Keller's personalized system of instruction: Was it a fleeting fancy or is there a revival on the horizon?. *The Behavior Analyst Today*, 8(3), 317-324. Retrieved from <http://www.eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=EJ800986>

Geeslin, D. H. (1984). A survey of pupil opinion concerning learning for mastery. *Education*, 105(2), 147-150. Retrieved from <http://web.ebscohost.com.proxy.library.ndsu.edu/ehost/pdfviewer/pdfviewer?sid=1d8c93e7-ddf5-4779-88fb-6ba2f9754a59%40sessionmgr110&vid=2&hid=106>

Gentile, J. R. (2004, Winter). Assessing fundamentals in every course through mastery learning. *New Directions for Teaching & Learning*, (100), 15-20. Retrieved from <http://web.ebscohost.com.proxy.library.ndsu.edu/ehost/pdfviewer/pdfviewer?sid=049d90f4-f65f-4b29-bdfa-6c809f04c27b%40sessionmgr112&vid=2&hid=106>

Guskey, T. R. (1980, March). Mastery learning: Applying the theory. *Theory Into Practice*,

- 19(2), 104-111. Retrieved from <http://web.ebscohost.com.proxy.library.ndsu.edu/ehost/pdfviewer/pdfviewer?sid=0e0dc1f5-183d-4c7c-82ef-408863197586%40sessionmgr13&vid=21&hid=25>
- Guskey, T. R. (2007, Fall). Closing achievement gaps: Revisiting Benjamin S. Bloom's "Learning for Mastery". *Journal of Advanced Academics*, 19(1), 8-31. Retrieved from <http://www.eric.ed.gov.proxy.library.ndsu.edu/PDFS/EJ786608.pdf>
- Guskey, T. R., & Pigott, T. D. (1988, March/April). Research on group-based mastery learning Programs: A meta-Analysis. *Journal of Educational Research*, 81(4), 197-216. Retrieved from <http://web.ebscohost.com.proxy.library.ndsu.edu/ehost/pdfviewer/pdfviewer?vid=3&hid=106&sid=b4abf2f6-cbf9-47ba-8653-e8ba12f89df3%40sessionmgr4>
- Ironsmith, M., & Eppler, M. A. (2007). Mastery learning benefits low-aptitude students. *Teaching of Psychology*, 34(1), 28-31. doi: 10.1207/s15328023top3401_6
- Keller, J.M. (1987). Development and use of the ARCS model of motivational design. *Journal of Instructional Development*, 10(3), 2-10. Retrieved from http://ocw.metu.edu.tr/pluginfile.php/8620/mod_resource/content/1/Keller%20Development%20%20Use%20of%20ARCS.pdf
- Krank, H., & Moon, C. E. (2001, Spring). Can a combined mastery/cooperative learning environment positively impact undergraduate academic and affective outcomes?. *Journal of College Reading and Learning*, 31(2), 195-208. Retrieved from <http://ic.galegroup.com.proxy.library.ndsu.edu/ic/suic/AcademicJournalsDetailsPage/AcademicJournalsDetailsWindow?displayGroupName=Journals&disableHighlighting=false&prodId=SUIC&action=e&windowstate=normal&catId=&documentId=GALE%7CA>

75891596&mode=view

Kulik, C. C., Kulik, J. A. & Bangert-Drowns R. L. (1990, Summer). Effectiveness of mastery learning programs: A meta-analysis. *Review of Educational Research*, 60(2), 265-299. doi:10.3102/00346543060002265

Lai, P., & Biggs, J. (1994, January). Who benefits from mastery learning?. *Contemporary Educational Psychology*, 19(1), 13-23. Retrieved from <http://dx.doi.org/10.1006/ceps.1994.1002>

Livingston, J. A., & Gentile, J. (1996, November/December). Mastery learning and the decreasing variability hypothesis. *Journal of Educational Research*, 90(2), 67-74. Retrieved from <http://web.ebscohost.com.proxy.library.ndsu.edu/ehost/pdfviewer/pdfviewer?sid=89176837-0358-4a30-b8aa-57449d8ab19a%40sessionmgr112&vid=2&hid=106>

Martinez, J. R., & Martinez, N. C. (1999, May/June). Teacher effectiveness and learning for mastery. *Journal of Educational Research*, 92(5), 279-285. Retrieved from <http://web.ebscohost.com.proxy.library.ndsu.edu/ehost/pdfviewer/pdfviewer?sid=8ac568f0-1299-4bd8-8dd7-179c98ebdac2%40sessionmgr115&vid=2&hid=106>

McGuire, M. J. & MacDonald, P. M. (2009, June). Relation of early testing and incentive on quiz performance in introductory psychology: An archival analysis. *Journal of Instructional Psychology*, 36(2). 134-14. Retrieved from <http://web.ebscohost.com.proxy.library.ndsu.edu/ehost/pdfviewer/pdfviewer?sid=5cdf531-0502-4e0d-9065-7b139295fb69%40sessionmgr15&vid=13&hid=106>

Northwest Evaluation Association. (2013). FAQ: Measures of academic progress (MAP). Retrieved from <http://www.nwea.org/about-nwea/faq/Measures%20of>

%20Academic%20Progress%20%28MAP%29

- Palardy, J. (1993, December). Another look at mastery learning. *Journal of Instructional Psychology*, 20(4), 302-305. Retrieved from <http://web.ebscohost.com.proxy.library.ndsu.edu/ehost/detail?sid=a05fba0c-9ff0-4a00-a591-5efd11d4842b%40sessionmgr115&vid=2&hid=106&bdata=JnNpdGU9ZWhvc3QtbGl2ZSZzY29wZT1zaXRl#db=aph&AN=9508010363>
- Wachanga, S.W. (2002). Relative effects of cooperative class experiment teaching method on secondary school students' motivation to learn chemistry in Nakuru District, Kenya. *Zimbabwe Journal of Educational Research*, 14(3), 229-253.
- Washburne, C. W. (1920, September). The individual system in Winnetka. *The Elementary School Journal*, 75(1), 52-68. Retrieved from <http://www.jstor.org.proxy.library.ndsu.edu/stable/993770>
- Zimmerman, B. J., & Dibeneditto, M. K. (2008, March). Mastery learning and assessment: Implications for students and teachers in an era of high-stakes testing. *Psychology in the Schools*, 45(3), 206-216. doi: 10.1002/pits.20291

APPENDIX A. IRB

Institutional Review Board

...for the protection of human participants in research

North Dakota State University
Sponsored Programs Administration
1735 NDSU Research Park Drive
NDSU Dept #4000
PO Box 6050
Fargo, ND 58108-6050 231-8995(ph) 231-8098(fax)

Date Received

IRB Protocol #:

IRB PROTOCOL FORM

Application to Conduct Research Involving Human Participants

1. Title of Project: The impact of mastery learning instructional methods on 8th grade students in language arts classroom compared to traditional instructional methods using quantitative measures.

2. Principal Investigator: Anita Welch Dept. name: School of Education
(PI must be an NDSU faculty or staff member; graduate students must list their advisor as PI)

Campus address/phone: 210K FLC/1-5498
anita.welch@ndsu.edu

Email address:

Specify role in this research: ☒ direct/supervise research ☐ PI

Highest earned degree and field of study: Ph.D. science education with minor in program evaluation/statistics

3. Co-Investigator(s): Kelly Mogen Dept. name: School of Education

Campus address/phone: 701347-5352
kelly.mogen@my.ndsu.edu

Email address:

Specify role in this research: ☐ co-PI

Highest earned degree and field of study: BA in English Education

4. Research team: List all NDSU students, faculty or staff who will assist in the project (project design/oversight, recruiting participants, obtaining informed consent, intervening or interacting with participants to obtain information/data, and/or handling identifiable information for research purposes). May provide as a separate attachment.

Name, dept. or affiliation: Specify role in research: Training date (IRB office only)

Anita Welch School of Education	Co-PI	
Larry Napoleon School of Education	Researcher	
Mari Borr School of Education	Researcher	
Donna Grandbois School of Education	Researcher	

Please Note: Investigators and all members of the research team are required to complete a course in the protection of human research participants prior to protocol review. This training must be current (within the last 3 years). Refer to the 'Training' page of the IRB website for information and links to online training sessions.

5. Project dates: indicate the anticipated start and end dates for research procedures involving human subjects: *(Note that start date should allow sufficient time for IRB review and approval; no research procedures involving human participants may begin prior to obtaining notification of IRB approval.)*

Anticipated start date: September 2012	Anticipated end date: October 2016
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6. Requested review category: *(final determination will be made by the IRB)*

- ☒ Expedited review *(*Include the Expedited Review Categories attachment)*
☐ Full board review

Project Description

Use plain language, avoiding technical terms or jargon, unless explained. The description should be understandable to any person unfamiliar with the area of research. Include a brief summary of the pertinent literature with citations, if applicable.

1. Purpose and goals of the research:

There is little current research on the influence of mastery learning on academic achievement for middle school students. The research would help determine whether or not the implementation of mastery learning in the classroom can reach students more effectively than traditional classroom instruction.

The purpose of this study is to examine the impact of the mastery learning approach on 8th grade language arts instruction and assessment on academic gains and attitudes for students in comparison to academic gains and attitudes for students in traditional classrooms as measured by questionnaire results, MAP testing results, and classroom grades.

2. Method and procedures: *Explain in detail what subjects will be asked to do or what information will be collected about them. Specify when or how often research procedures will be conducted. Provide a timeline or schedule of events, if applicable. May be provided as a separate attachment, with numbered pages.*

The purpose of this study is to measure the effectiveness of mastery learning for students in language arts. This study will use a quantitative and qualitative method of gathering data. The focus is on the use of mastery instruction as the independent variable, half of the students will be taught using the mastery method and half using traditional method. The mastery method of instruction means that student does not move onto new material until a predetermined level of mastery has been obtained, such as a score of 80% on a summative test. This allows for more individualized instruction to fit the various student levels. Until that level of mastery is reached for each student, a variety of interventions are used such as additional worksheets, one-on-one peer or teacher tutoring, small group work, or computer generated options. For those students that quickly reach mastery, enrichment activities such as independent writing, peer tutoring, or individual projects are used. The traditional method of instruction is characterized by lecture, rote learning, and little or no individualized instruction. Instead, all instruction and coursework is directed towards the average student. MAP testing occurs in late October, so that data will provide a baseline for all students before any change in instructional method is employed. This is a schoolwide test and the results are immediately reported to each student individually, and each teacher gets a summary report of all students in their respective teaching grade. I will receive this report from administration in both the fall and the spring. Once MAP testing has been completed in both the fall and the spring, students will also complete the Biggs Revised Student Process Questionnaire which is 20 items long that will help assess learning style; and the Students' Motivation Questionnaire (SMOQ), which was validated by Wachanga (2002) and Bunting, Coll & Campbell (2006) and modified to suit the study. It is 26 questions long and is used to assess student attitudes towards language arts and self-efficacy in language arts. The pretest leaves out the distinction of mastery learning and just asks the questions in terms of language arts.

After the fall MAP testing has been completed, the mastery instruction will be introduced in half the classes while the other half will continue with traditional instruction. All classes will cover the same material, just the method of instruction will change. MAP testing will be administered again in early April, after which the same questionnaire used before the introduction of the mastery learning will be administered to all groups. The posttest SMOQ asks the same questions to the control group as it did in the pretest, but the posttest SMOQ for the experimental group will specifically refer to language arts using the mastery learning approach for the experimental group. Class grades will be maintained throughout the entire school year and quarterly grades will also be used to measure instructional impact.

3. Project/performance site(s): *Specify where the research will be conducted.*

Central Cass Middle School, Casselton, ND
Four 8th grade language arts classrooms taught by Mrs. Mogen

4. Research design and analysis plan: *If applicable, describe the sampling plan, the size of the sample or study group(s), and the power of the planned statistical tests.*

☐ N/A

Sample: The study will be used in four 8th grade language arts classrooms at Central Cass High School in Casselton, ND. This will consist of approximately 65 students from a small, rural community, and the students will be assigned to the classroom based on class scheduling needs, so it will not be random assignment, although the classroom treatments will be assigned after the students are placed. I anticipate having enough power to run an ANOVA two-tailed statistical analysis.

5. Additional materials: Will the research involve use of data, documents, records or specimens that have already been collected (pre-existing) from individuals, or will be collected solely for non-research purposes?

☐ No


☒ Yes: a. Complete the 'Additional Materials' attachment.
b. If the research will be *limited* to use of these pre-existing materials, or materials collected solely for non-research purposes (*research will not involve interaction, intervention or observation of human research participants*), then skip to the 'Risks and Benefits' section. Also complete the 'Informed Consent Waiver or Alteration Request' if the requirement for informed consent is requested to be waived.

Recruitment

Selection of research participants must consider the following: research setting, equitable recruitment potential for coercion or undue influence, and vulnerable groups.

1. Research participants and recruitment methods: Describe participants, including approximate #, age-range, or any other relevant characteristics. Also describe in detail how they will be selected, identified, contacted or approached to participate in the research:

Students will be from 13 to 15 years old and involve both males and females. The students will be assigned to one of four sections taught by Kelly Mogen (the only 8th grade language arts teacher) by the principal based on class scheduling needs. The students will be asked to participate in the study and permission will be requested from them as well as their parents. Students who choose not to participate in the study will still receive the same instruction as the rest of the class does, but the researcher will omit the data from the MAP testing and classroom grades. Those students not participating will not complete the questionnaires.

 Attach a copy of any oral script, advertisement, announcement or preliminary invitation that will be used.

2. Describe any inclusion/exclusion criteria that will be used for subject selection, if applicable:

☒ N/A

3. Vulnerable populations: Indicate if individuals from any of the following groups will be specifically targeted:

- ☒ minors (under age 18) - *also complete the 'Children in Research Attachment' form.*
- ☐ prisoners - *also complete the 'Prisoners in Research Attachment' form.*
- ☐ pregnant women, fetuses or neonates
- ☐ cognitively impaired individuals – may require consent of a legally authorized representative
- ☐ economically disadvantaged persons
- ☐ educationally disadvantaged persons
- ☐ N/A - None of these groups will be specifically recruited

If any vulnerable populations will be recruited, indicate what additional safeguards will be included to protect participants' rights and welfare:

Both parental and student consent will be obtained.

4. Compensation: Will participants or others be offered incentives for the research (i.e., gifts, payment, reimbursement, services, extra course credit, or other forms of compensation)?
Compensating participants for their time and effort is appropriate, although the amount of compensation must not cause undue influence to participate in a study. Any compensation should also be pro-rated, rather than awarded only on completion of the study. If research will involve compensating students with extra credit, specify the amount of extra credit, and what non-research alternatives (equal in time and effort) are available to the students for earning extra credit.

- ☒ No
- ☐ Yes - provide details of the compensation scheme :

5. Alternatives to research participation: Describe any alternative procedures available to those who choose not to participate, if applicable.

☒ N/A

6. Dual relationships*: Does the investigator, co-investigator, any member of the research team, or anyone else assisting with the research has an authority relationship (e.g., instructor/student, employer or supervisor/employee, physician/patient, or other) with potential participants?

- ☐ No
- ☒ Yes - describe the relationship, and indicate how the research will be conducted to avoid undue influence on participants:

Kelly Mogen will also be the instructor for the students in the project. It will be made clear that participation is voluntary and their grade will not be impacted by not participating in the study.

7. Will any aspect of the research be conducted in a classroom setting during class time?

☐ No

☒ Yes - describe what those who choose not to participate will be doing, and provide justification for use of class time for research (📎 Attach course syllabus):

Because this is an instructional method, it will simply be the data that is eliminated.
Classroom instruction would have to occur, so no loss in class time or alternative activity needs to be offered.

Informed Consent

Potential subjects must be provided with complete and easily understandable information about the study, fully informed of the voluntary nature of their choice, and given sufficient opportunity to consider participation in an environment that is free of coercion or undue influence. Participants cannot be made to waive any of their rights, or release the investigators, sponsor or institution from responsibility for any research-related harms.

1. Informed consent*: Explain procedures for obtaining informed consent from participants, their parent/guardian, or legally authorized representative. Be specific regarding who will obtain informed consent, and in what setting/time frame:

The parent and student consent forms will be sent either electronically to parents, or the students and parents will receive a hard copy. Once they are returned, they will be kept in a locked file cabinet that only Kelly Mogen has access to in her classroom which will also be locked at Central Cass School.

📎 Attach as applicable: informed consent form, parent/guardian permission form, child/youth assent forms to be used. Templates may be found on the IRB website 'Forms' page.
(Alternatively, a short form written consent document may be used, along with an oral presentation of the elements of informed consent. See IRB Standard Operation Procedures 9.2 Documentation of Informed consent.)

2. Will all adult participants have the capacity to consent? *Individuals who lack the capacity to consent (as a result of either a permanent or transient condition) may participate in research only if a legally authorized representative (LAR) gives consent on their behalf. For more information, please see the National Institutes of Health guidance at:*

<http://grants.nih.gov/grants/policy/questionablecapacity.htm> Also, please see [Standard Operating Procedure 10.3 Other Vulnerable Groups](#).

☒ Yes

☐ No - explain how legally authorized consent will be sought:


3. Will all participants (and their parents/guardians or legal representatives, as applicable) be fluent in English?

- ☒ Yes
☐ No - explain how informed consent will be obtained, and provide a copy of the translation to be used:

4. Will the research be conducted at an international site(s)?

- ☒ No
☐ Yes - indicate site(s) and investigators' familiarity with the culture/cultural norms, whether or not the different cultural context presents any problems or risks that need to be addressed, and how those issues will be handled:

5. Withholding information from participants, or use of deception: Will the research involve purposely withholding some or all information about the research from participants prior to their involvement, or involve any use of deception?

- ☒ No
☐ Yes -  Attach the 'Informed Consent Waiver or Alteration Request.'

6. Is a waiver of the signature requirement requested? Participants will be provided with full information about the research, but their signature will not be required. Agreement will be obtained in another manner.

- ☒ No
☐ Yes -  Attach the 'Informed Consent Waiver or Alteration Request'.

Risks and Benefits

Risks to subjects must be minimized by using sound research design, procedures that do not unnecessarily expose subjects to risk, or procedures that are already being performed on subjects for diagnostic or treatment purposes. Risks must be reasonable in relation to any anticipated benefits.

1. Risks: Indicate all potential risks of harm/discomfort to subjects or others in this research:

- ☒ Privacy
☐ Psychological
☐ Social
☐ Legal
☐ Economic
☐ Physical
☐ Dignitary
☐ Other -

2. Protection against risks: Describe each possible risk of harm/discomfort, including the probability and magnitude, as well as the steps that will be taken to minimize these risks for subjects or others:

Only the research team will have access to the questionnaire results. The results from the MAP testing will be utilized by school officials as they have been in the past, but the results provided to Mrs. Mogen will only be accessed by the research team. Student names are listed on the reports, but the reports will be locked in a file cabinet in Mrs. Mogen's room which will also be locked and that only she and school administration have access to. As soon as the final questionnaire is completed, all data will be recoded to get rid of any identifying information. It is necessary to maintain the identities until this point because I am collecting pre and post intervention testing and questionnaire data that need to be matched. All electronic data will be maintained on a laptop secured by Central Cass Schools. All are password protected with anti-virus protection and locked in a cabinet in a locked classroom at the school when not in use. Results of the project will be reported in Mrs. Mogen's thesis paper and to the school's administration, parents and students that participated in the study, and other school officials as requested and deemed appropriate by the school.

3. Describe what steps will be taken if participants experience serious injury, distress, discomfort or decompensation during research participation: ☒

N/A

4. Risk category: Categorize the level of risk you consider appropriate for the research: *Federal regulations define 'minimal risk' as the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests.*

☒ No more than minimal risk

☐ A minor increase over minimal risk*

☐ More than a minor increase over minimal risk*

4a. Indicate what provisions will be taken to monitor the data collected to ensure the safety of subjects, and report unanticipated problems involving risks to subjects or others.

Only the research team will have access to the questionnaire results. School officials will utilize the results from the MAP testing as they have been in the past, but the research team will only access the results provided to Mrs. Mogen. Student names are listed on the reports, but the reports will be locked in a file cabinet in Mrs. Mogen's room which will also be locked and that only she and school administration have access to. As soon as the final questionnaire is completed, all data will be recoded to get rid of any identifying information. It is necessary to maintain the identities until this point because I am collecting pre and post intervention testing and questionnaire data that need to be matched. All electronic data will be maintained on a laptop secured by Central Cass Schools. All are password protected with anti-virus protection and locked in a cabinet in a locked classroom at the school when not in use. Results of the project will be reported in Mrs. Mogen's thesis paper and to the school's administration, parents and students that participated in the study, and other school officials as requested and deemed appropriate by the school. Only group data, not individual data will be reported.

5. Benefits and risk-benefit analysis: *Describe any potential benefits to participants and/or society in general. Explain why the risks should be considered reasonable in relation to any anticipated benefits and/or in relation to the importance of the knowledge that is expected to result.*

The work produced by this study may have the following benefits:

1. Aid in developing effective instructional methods
2. Improved attitudes towards learning language arts
3. Improved levels of self-efficacy in learning language arts
4. Improved academic achievement in language arts

6 Clinical trial: *NIH defines a clinical trial as a prospective biomedical or behavioral research study of human subjects that is designed to answer specific questions about biomedical or behavioral interventions (drugs, treatments, devices, or new ways of using known drugs, treatments, or devices). Behavioral studies involving an intervention to modify behavior (diet, physical activity, cognitive therapy, etc.) also fit the definition of a clinical trial.*

☒ No

☐ Yes - indicate what provisions will be taken to monitor the data collected to ensure the safety of subjects, and report unanticipated events involving risks to subjects or others: *(may provide as an attachment):*

Data and safety monitoring information: http://grants2.nih.gov/grants/policy/hs/data_safety.htm)

Clinical trial registration requirement: Federal law requires pre-registration of clinical trials involving FDA-regulated drugs, biologics and devices. See FAQs at:

<http://prsinformo.clinicaltrials.gov>. Also note that some journals and sponsors may require registration for all clinical trials, including those involving only social or behavioral interventions.

7. Use of human blood, tissues, or specimens:


☒ No

☐ Yes – Project also requires review/approval from the Institutional Biosafety Committee.

If an NDSU employee will handle human blood/tissues/specimens, participation in NDSU's Bloodborne Pathogen Program is also required; contact the University Police and Safety Office for more information.

8. Investigational use of a drug, biological product, medical device, or other product regulated by the FDA:

☒ No

☐ Yes -  Attach additional information regarding risks and FDA approval status.

Instrument(s)

Provide the list of questionnaire, interview or focus group questions, or oral history objective (may be provided as a separate attachment)

Privacy and Confidentiality

When appropriate, there must be adequate provisions to protect the privacy of subjects and maintain the confidentiality of data.

1. Confidentiality: Describe whether or not participants will be promised confidentiality of their responses or information. Include who will have access to individual data, and how results will be reported:

Participants will be promised confidentiality. No identifiers are asked as part of the questionnaire. Only the research team will have access to the questionnaire results. The results from the MAP testing will be utilized by school officials as they have been in the past, but the results provided to Mrs. Mogen will only be accessed by the research team. Student names are listed on the reports, but the reports will be locked in a file cabinet in Mrs. Mogen's room which will also be locked and that only she and school administration have access to. As soon as the final questionnaire is completed, all data will be recoded to get rid of any identifying information. It is necessary to maintain the identities until this point because I am collecting pre and post testing data that need to be matched. All electronic data will be maintained on a laptop secured by Central Cass Schools. All are password protected with anti-virus protection and locked in a cabinet in a locked classroom at the school when not in use. Results of the project will be reported in Mrs. Mogen's thesis paper and to the school's administration, parents and students that participated in the study, and other school officials as requested and deemed appropriate by the school.

2. Identifiable information: Will any information be collected, even temporarily, that could potentially identify an individual? *(This would include not only names, personal ID #s, address, video or audio recordings, or other direct identifiers, but also may include certain demographic or unique information that would enable an individual's identity to be deduced.)*

☐ No

☒ Yes:

2a. Describe use of any identifying information, including codes, or linkages to identifiers; and indicate why these are necessary for the research:

Student first and last names will be used for MAP testing since the school determines that. The questionnaires will include first and last names as well so that they can be matched for pre and post intervention changes as well as to MAP testing scores and classroom grades and GPAs.

2b. Indicate whether these identifiers, codes or linkages will be retained after data collection, and if they will be removed at some point:

All identifiers will be removed as soon as the last questionnaire is completed at the end of the study as soon as the various items collected have been matched up.

2c. Would identification of subjects or their responses place them at risk of: ☐ criminal liability, ☐ civil liability, or be damaging to their: ☐ financial standing, ☐ employability, ☐ insurability, ☐ reputation, or be ☐ stigmatizing?

☒ N/A

3. Video/audio tape recording*: Will participants be recorded (e.g., audio, video)?

☒ No

☐ Yes - describe the type of recordings and specify how they will be used, stored/secured, and their final disposition *(also provide this information to participants on the consent document)*:

**Note that recordings are considered individually identifiable.*

4. Data safeguarding procedures (hard-copy records): Specify the physical security procedures that will be used to prevent a breach of confidentiality of participants' information during data collection, transfer, analysis and storage: ☐

N/A

All permission form hard copies and results from the MAP testing will be stored in a locked file cabinet in Mrs. Mogen's classroom, which will also be locked. Only Mrs. Mogen and administration would have access to the file cabinet.

5. Data safeguarding procedures (electronic records): Specify the electronic security procedures that will be used to prevent a breach of confidentiality of participants' information during data collection, transfer, analysis and storage *(i.e., password authentication, use of unique log-ins, data encryption,*

secure server, firewall, latest anti-virus protection, etc. Research data should be stored on computers maintained by NDSU ITS, or that conform to NDSU ITS standards):

☐ N/A

All electronic data will be maintained on a laptop secured by Central Cass Schools. All are password protected with anti-virus protection and locked in a cabinet in a locked classroom at the school when not in use.

6. Mandated reporting responsibility: Is there is a possibility that certain information will be obtained in the course of the research that you will be legally obligated to disclose to the proper authorities (e.g., child abuse, or other abuse, or threats of harm)?

☒ No

☐ *Yes –describe:

* This must also be disclosed to participants in the consent document.

Note: For some studies involving sensitive data collection, a Certificate of Confidentiality may be obtained from the National Institutes of Health to protect an individual participant's information from involuntary disclosure. Visit the NIH website for more information.

Other Information

1. Conflict of Interest: does the Principal Investigator, Co-Investigator, or other key personnel have a conflict of interest (financial or other conflict) in the results of this project? *Note: A significant conflict may require disclosure to participants in the informed consent form.*

☐ No

☒ Yes:

1a. Identify the individual and explain the nature of the potential conflict of interest:

I am interested in the effectiveness of this teaching method when I use it with my students, so I do have a conflict of interest

1b. Explain how this potential conflict will be managed:


I will not be giving extra credit for participating in the study, all of the data will be recoded for anonymity as soon as possible after data collection has occurred. Student participation or lack thereof will not affect their grade for the course.

2. Funding: Has an external agency or sponsor agreed to provide funding for the project?

☒ No

☐ Yes- PTF #: FAR00

Agency or Sponsor*:

 Attach complete copy of final grant application, agreement or contract.

2a. Were external funds made available for the project prior to IRB approval (via the IRB pre-screening process?) ☐ No ☐ Yes:

2b. Does the grant, agreement or contract related to this project include multiple human subjects research activities that are *not* described in this IRB protocol?

- ☐ No; all human subject activities are covered in this IRB protocol
- ☐ Yes; these activities will be covered in a future IRB protocol(s)*
- ☐ Yes; these activities have been covered by a previous IRB protocol(s) #:
- ☐ Yes; these activities have been or will be reviewed by another IRB:
- ☐ Other; explain:

* The PI is responsible for obtaining IRB approval prior to initiation of any future human subjects research activities.

*Note:

- *To certify IRB approval of an award, the final funding proposal and the IRB protocol are compared to verify consistency with respect to human subjects activities.*
- *If external funds will be used for the project, Sponsored Programs Administration requires internal approval of the proposal by submission of a Proposal Transmittal Form (PTF). Consult the SPA website (<http://www.ndsu.edu/research/spa/index.php>) for more information.*

3. Other institution(s): Are any outside entities engaged in this research (e.g., receiving a direct award, grant or contract to perform research, directing or supervising the research, intervening and/or interacting with participants for research purposes, obtaining informed consent, obtaining private identifiable information or specimens from any source for research purposes, or utilizing private information or human specimens for FDA regulated research)? For additional information, please see the 'NDSU Collaborative, Multi-Site or Off-site Research Worksheet' available on the 'Forms' page of the IRB website.

☒ No – skip all remaining questions

☐ Yes – name entity or institution, contact person(s), and describe their role in the research:


Name of outside entity or institution:

Contact person:

Their role in the research:

3a. Other IRB review: Has/will this project be submitted to another IRB for review?

☐ Yes* - name of IRB and status of the application:

 *Attach a complete copy of the protocol reviewed and the IRB's determination. (if not immediately available, may be forwarded upon receipt)

☐ No: provide either:

- a letter of permission/cooperation stating:
 - a brief description of the entity's role in the research that appropriate training will be completed prior to involvement of human subjects
 - the project will be conducted according to the approved protocol and NDSU policies for protecting research subjects.

NOTE: If letter(s) or approval(s) from sites or collaborator(s) are not immediately available, the IRB may approve the protocol provided that:
1) all other requirements are met, and
2) the documentation from the site(s) will be forwarded to the IRB prior to initiating research at each site.

Investigator's Assurance

The signature(s) below certify that:

- information provided in this application is complete and accurate*
- the principal investigator has the ultimate responsibility for the protection of the rights, safety and welfare of human subjects and the ethical conduct of this research
- each individual listed as principal, co-investigator, or research team member has received the required human research protections education
- each individual listed as an investigator or member of the research team possesses the necessary experience for conducting research activities in their assigned role, and is aware of and will abide by NDSU policies and procedures for the protection of research participants
- no research procedures with human subjects will be initiated until documented approval has been obtained from the IRB Office
- the research will be conducted according to the protocol approved by the IRB, in accordance with NDSU policies and procedures

Principal Investigator signature, date

Co-investigator (s) signature, date

The signature below certifies that:

- the research is scientifically valid;
- the investigator(s) and their team are qualified to conduct the project;
- facilities, equipment, and personnel are adequate; and
- continued guidance will be provided as appropriate.

Chair, Dean or Director* signature, and date:

** If the PI or co-investigator is the Dept. Chair, College Dean must sign.*

* Carefully review the application to ensure it is complete, contains sufficiently detailed responses to all questions, and all attachments. Incomplete applications will be returned without IRB review or approval, potentially delaying the research. Contact the IRB Office for questions or assistance at: 231-8995 or 231-8908.

Letter of Explanation (sent by teacher to parents via email or print formats):

Dear Parents and Students

I am conducting research for my master's thesis, and I, along with my advisor are seeking your help in a research study involving students in eighth grade language arts class.

This project has four objectives: 1) to improve academic achievement in language arts; 2) to investigate the impact of mastery learning on academic achievement; 3) investigate the impact of mastery learning on attitudes towards language arts; 4) to examine associations between students' perceptions of mastery learning and their perceptions of academic efficacy language arts

Mastery Learning is an instructional strategies that combines frequent, informal assessments to help students understand material, with additional instruction being offered to students in the form of peer assistance, teacher one-on-one, and additional worksheets or other instructional materials. Students do not move on to new information until they have reached a level of proficiency, around 80% on an end of the unit test.

I invite you to participate in this research by allowing your child to complete two online questionnaires, which will take approximately 30 minutes to complete, once in the fall, and once in the spring. The MAP tests that students take in the fall and the spring will also be used in the data collection process as well as classroom grades, journal entries, and classroom observations.

I ask that you read the attached parent information letter and questionnaire information. Please sign the attached consent form and return it to me within seven days.

Your participation and that of your child, in this study is voluntary and your decision whether or not to participate will involve no penalty or loss of benefits to your child or during the school year.

Your assistance in this research study is greatly appreciated. If you have any questions, please contact Dr. Anita Welch at 701.231.5498 or anita.welch@ndsu.edu or Kelly Mogen at 701.347.5352 or kelly.mogen@my.ndsu.edu

YOUTH ASSENT FORM
Mastery Learning Instructional Method in Language Arts

Invitation:

- You are invited to take part in a research study to study how mastery learning impacts grades, learning attitudes, and attitude towards language arts
- The study is being done by Kelly Mogen, from Central Cass Schools and Dr. Anita Welch from North Dakota State University

What will the research involve?

- If you agree to take part, you will be asked to complete a questionnaire in the fall and the spring about how you feel about language arts, how you learn, and how good you think you are at learning. It will include 25 questions.
- The scores you earn when you do the MAP testing in the fall and again spring will be included.
- Journal entries that you produce during class will be involved.

What are any risks or benefits for me?

- There are no known risks to you for participation in the study.

Do I have to take part in the research?

- Your parent(s) or legal guardian(s) have given their permission for you to be in the research, but it is still your choice whether or not to take part.
- Even if you say yes now, you can change your mind later, and stop participating.
- Your decision will have no effect (bad or good) on *your class grade*.

Who will see my answers and information?

- We will make every effort to keep your information private; only the people helping us with the research will know your answers or see your information.
- Your information will be combined with information from other people in the study. When we write about the study, we will write only about this combined information, and no one will be able to know what your information is.
- NDSU and the researcher own all information collected for this project.
- If you want to look at the information we collect from you, just let us know, and we will provide it to you. But, you cannot look at information from others in the research.

What if I have questions?

- You should ask any questions you have right now, before deciding whether or not to be a part of the research.
- If you or your parent(s) have questions later, contact Dr. Anita Welch,

701.231.5498, anita.welch@ndsu.edu or Kelly Mogen, 701.347.5352, kelly.mogen@my.ndsu.edu.

- Your parent(s) or legal guardian will receive a copy of this form to keep.

What are my rights?

- You have rights as a research participant.
- For questions about your rights, or to tell someone else about a problem with this research, you can contact the NDSU Human Research Protection Program (HRPP) at (701) 231-8908 or ndsu.irb@ndsu.edu.
- The HRPP is responsible to make sure that your rights and safety are protected in this research. More information is available at: www.ndsu.edu/research/irb.

Sign this form only if you:

- have understood what the research is about and why it's being done,
- have had all your questions answered,
- have talked to your parent(s)/legal guardian about this project, and
- agree to take part in this research

Your Signature

Printed Name

Date

Name of Parent(s) or Legal Guardian(s)

Researcher explaining study
Signature

Printed Name

Date

PARENT/GUARDIAN PERMISSION TO PARTICIPATE IN RESEARCH
Mastery Learning Instructional Method in Language Arts

Research Study

Your child/legal ward is invited to participate in a research study of the impact of mastery learning instructional methods on academic achievement and satisfaction in the language arts classroom being conducted by Kelly Mogen from Central Cass Schools and Anita Welch from North Dakota State University

Basis for Participant Selection

Your child/legal ward has been selected because they are part of the English class, which is taught by Mrs. Mogen.

Purpose of Study

The purpose of this study is to examine the impact of the mastery learning approach on 8th grade language arts instruction and assessment on academic gains and attitudes for students in comparison to academic gains and attitudes for students in traditional classrooms as measured by questionnaire results, MAP testing results and classroom grades.

Explanation of Procedures

Students will complete a 25 question questionnaire regarding attitudes towards school, subject area, self-efficacy in terms of learning, and learning style in an online questionnaire form in late October and again in early May. The students will also take the fall and spring MAP testing as implemented by the school, and those results will be analyzed. In addition to this, class grades will also be analyzed. Students will either receive instruction in the traditional manner or by using a mastery learning method. All classes will learn the same material, complete the same graded assignments, and Mrs. Mogen will teach all classes. This research will be conducted at Central Cass Schools during regular class hours, and it will begin after the first quarter of school, and end at the end of the school year.

Potential Risks and Discomforts

A potential risk is the loss of privacy. No identifying information, such as name, will be asked and only those individuals on the research team will have access to the questionnaire results. The test results will be accessible to those individuals and entities that Central Cass Schools identifies as well as the research team.

Potential Benefits

The work produced by this study will have the following benefits:

1. Aid in developing effective instructional methods
2. Improved attitudes towards learning language arts
3. Improved levels of self-efficacy in learning language arts
4. Improved academic achievement in language arts

Assurance of Confidentiality

Participants will be promised confidentiality. No identifiers are asked as part of the questionnaire. Only the research team will have access to the questionnaire results. Results of the project will be reported in Mrs. Mogen's thesis paper and to the administration, parents and students that participated in the study, and other school officials as requested. All permission form hard copies and results from the MAP testing will be stored in a locked file cabinet in Mrs. Mogen's classroom, which will also be locked. Only Mrs. Mogen and administration would have access to the file cabinet. All electronic data will be maintained on a laptop secured by Central Cass Schools. All are password protected with anti-virus protection and locked in locked office at the school when not in use. Data and records created by this project are owned by the University and the investigator. You may view information collected from your child/legal ward by making a written request to the principal investigator. You may view only information collected from your child/legal ward, and not information collected about others participating in the project.

Voluntary Participation and Withdrawal From the Study

Your child/legal ward's participation is voluntary and he/she can quit at any time. Your decision whether or not to allow your child/legal ward to participate will not affect you or your child/legal ward's grade in the class. If you decide to allow your child/legal ward to participate, you are free to withdraw your permission and to discontinue their participation at any time.

Offer to Answer Questions

You and your child/legal ward should feel free to ask questions now or at any time during the study. If you or your child/legal ward has questions about this study, you can contact Dr. Anita Welch, 701.231.5498, anita.welch@ndsu.edu or Kelly Mogen, 701.347.5352, kelly.mogen@my.ndsu.edu. If you have questions about the rights of human research participants, or wish to report a research-related problem or injury, contact the NDSU IRB Office at (701) 231-8908 or ndsu.irb@ndsu.edu.

Consent Statement

By signing this form, you are stating that you have read and understand this form and the research project, and are freely agreeing to allow your child/legal ward to be a part of this study. If there are things you do not understand about the study, please ask the researchers before you sign the form. You will be given a copy of this form to keep.

Parent/Guardian Signature	Printed Name	Date
Parent/Guardian Signature	Printed Name	Date
Relation to Participant	Name of Child/Legal Ward	

Researcher obtaining permission:

Signature

Printed Name

Date

Student Recruitment script given by the teacher:

I am conducting research for my master's thesis, and I, along with my advisor are asking for your help in a research study involving students in eighth grade language arts class.

I invite you to participate in this research by completing two online questionnaires, once in the fall, and once in the spring. which will take about 30 minutes to complete The questionnaires will ask questions related to your learning styles, how you feel about learning language arts, and how successful you think you are at understanding language arts. The MAP tests that you take in the fall and the spring will also be used in the data collection process as well as your classroom grades.

I ask that you read the attached consent letter and questionnaire information. Please sign the attached consent form and return it to me within seven days.

Your participation in this study is voluntary and your decision whether or not to participate will not impact your grade in this class.

Your assistance in this research study is greatly appreciated. If you have any questions, please contact Dr. Anita Welch at 701.231.5498 or anita.welch@ndsu.edu or Kelly Mogen at 701.347.5352 or kelly.mogen@my.ndsu.edu

Syllabus English 8

<u>Week of:</u>	<u>Focus</u>
Oct 22-26	Adjectives, Adverbs, Prepositions
Oct 29- Nov 2	Participles, Gerunds
Nov 5-9	Infinitives, Appositives, Verbals
Nov 12- 16	Adjective and Adverb Clauses
Nov 19-21	Noun Clauses
Nov 26-30	Sentence structure
Dec 3-7	Sentence structure
Dec 10-14	Subjects and Predicates
Dec 17-21	Catch up week...review what we have covered
Jan 4-7	Types of sentences
Jan 14-18	Continue sentence work-combining, complexity
Jan 22-25	Subject/Verb Agreement
Jan 28-Feb 1	Pronoun/Antecedent Agreement
Feb 4-8	Verb Tenses
Feb 11-14	Verbs
Feb 18-22	Case
Feb 25- March 1	Modifiers
Mar 4-7	Catch up week...review what we have covered

APPENDIX B. SAMPLE MAP QUESTIONS

LANGUAGE USAGE	below 161	161-170	171-180	181-190	191-200	201-210	211-220	221-230	above 230
Writing Process Students are able to write, draft, revise, edit, and proofread.	Study the graphic organizer.  Which word would best complete the graphic organizer? 1. better 3. loud 2. sweet 4. silly	Which group of words would be best to use to tell about the Moon? 1. soft, small, blue 2. close, green, cold 3. white, round, full 4. wet, black, square	Read the paragraph. A cat is a great pet to have. To keep your cat healthy, make sure to give it plenty of fresh water. Dogs like to swim. Don't feed your cat human food. For a special treat, you can give your cat some catnip. Which sentence does best belong in the paragraph? 1. A cat is a great pet to have. 2. Dogs like to swim. 3. Don't feed your cat human food. 4. For a special treat, you can give your cat some catnip.	Read the paragraph. I always look forward to winter for one reason: hot chocolate. Hot chocolate is my favorite. It warms me up when I am really cold. Which sentence could be added to describe what hot chocolate tastes like? 1. It is sweet and warm and so chocolaty! 2. Hot chocolate comes in different flavors. 3. I have hot chocolate every day in winter. 4. Hot chocolate is drunk by people of all ages.	Read the paragraph. Amy was in a rush this morning. She forgot her books. She felt embarrassed walking into class during Mr. Bishop's lecture on Greek city-states. She sat on the floor outside the class and waited. Which revision of the sentences best shows a cause-effect relationship between the ideas in the paragraph? 1. Since Amy was in a rush this morning, she forgot her books. She was late and felt embarrassed interrupting Mr. Bishop's lecture, so she sat on the floor outside class and waited. 2. Amy waited sitting on the floor outside class. Before that, she realized she forgot her books. Before that, she had been rushing. 3. First, Amy had been in a rush this morning. Then, she forgot her books. Next, she felt embarrassed to interrupt Mr. Bishop's lecture. Finally, she sat on the floor outside class and waited. 4. If Amy rushed in the morning, she might forget her books. If she forgot her books, she might be embarrassed to interrupt Mr. Bishop. If she felt embarrassed, she might sit on the floor outside class and wait.	Laurie decides to write a biography on the life of Pablo Picasso. Which method of organization will help Laurie to sequence the life of Picasso? 1. a Venn diagram 2. a timeline 3. a web 4. a graph	Your class just finished studying about rivers. Your teacher has assigned you to write a research paper that further explores rivers. Which of the following would be the best research question? 1. What is your favorite river? 2. How are the Nile and Amazon rivers different? 3. Where is the world's longest river? 4. How many times has the Nile River flooded?	You are writing a paragraph about how you felt one time when you were swimming. Once I was swimming because I was sad, and I swam as fast as I could, but I was still sad. Half the crying I used to swim to be the fastest, but not anymore. Now I swim to be healthy. I really want to be a lawyer because they help people. By swimming, you stay in shape, and you can grow up to be a healthy person. Which is the best way for you to revise your draft? 1. Stay on the subject. Take out the sentence about waiting to be a lawyer. 2. Explain why you wanted to be a lawyer because they help people. 3. Change some of the words so you sound more like a lawyer. 4. Introduce the paragraph with a sentence that explains why good health is important.	Read the information. Mike began his persuasive essay for his English class. <i>There is a mystery at our school today. We are being subjected to a poison. The school was built over eighty years ago. Back then, less was known about proper building materials. This means that the school was built with asbestos.</i> A peer reviewer gives that feedback to Mike. I like the opening paragraph, but think that the word "mystery" in the first sentence could be replaced with a more appropriate word that describes the current situation better. Which revision best incorporates the feedback from the peer reviewer? 1. There is a scene at our school today. 2. There is a problem at our school today. 3. There is a crime at our school today. 4. There is a pest at our school today.
Writing Types and Purposes Students recognize different types of writing and understand their purposes.	Read the sentence. Once there was a little elf who wanted to fly. This sentence might be used to 1. tell about something you saw last night. 2. begin a funny make-believe story. 3. thank Aunt Mary for a birthday present. 4. tell about a trip to a farm.	Read the poem. Roses are red, Violets are blue, Before I do quickly I'm coming for _____. Which rhyming word best completes the poem? 1. blue 2. through 3. better 4. grew	Read the sentences. You are invited to a birthday party for Jesse. It will be held at 1402 Pine Street from 2 - 4 PM on Wednesday, June 25th. These sentences would be used to write a 1. fairy tale. 2. party invitation. 3. letter. 4. book report.	Kenna is giving a speech to her class about the animals of Africa. Which should Kenna show her classmates to help them understand her topic? 1. a globe that shows the location of Africa. 2. a photo of each animal she talks about. 3. a tiger's tooth that her father found. 4. a bar graph showing the numbers of animals.	How is a poem developed? 1. State the idea and give examples or definitions. 2. Use words in rhythmic patterns to create images. 3. Tell what happened in the order it happened. 4. State your opinion and support it with facts or reasons.	Derrick is writing a science report about the moons of Jupiter. Which source of information will be most useful to Derrick? 1. a chart that shows the orbits of all the planets. 2. a science fiction movie about life on one of Jupiter's moons. 3. a book that names and describes the moons of each planet. 4. a magazine article that explains the origins of the universe.	These sentences form a paragraph. Which is the topic sentence? 1. Painting the window frames will take twice as much time as painting the walls. 2. A good brush and an extension ladder are necessary. 3. The most time-consuming job in painting a house is painting the trim. 4. The person who thinks the job is half done when the walls are finished is in for a surprise.	What does the conclusion to a report do? 1. states what you plan to discuss in the writing. 2. lists the sources used. 3. focuses on a specific supporting detail. 4. leaves the reader with a clear understanding of the report.	Which is the best thesis for a persuasive essay on World War I? 1. World War I began in 1914 when Archduke Ferdinand was shot. 2. America tried to stay neutral when World War I began. 3. World War I took place across Europe and Africa, lasting four long years. 4. World War I was inevitable due to many complicating factors.
Grammar and Usage Students understand the conventions of grammar and usage.	Choose the missing word. The dog _____ in the house. 1. am 2. is 3. are 4. were	Choose the missing word. Can you watch the movie with _____? 1. we 2. us 3. he 4. I	Choose the best words to complete the sentence. Oling is _____ his father, George. 1. tallest than 2. taller from 3. taller than 4. tall than	Read the sentence. The student wrote a report _____ Abraham Lincoln, our 16th president. Which preposition would best complete the sentence? 1. in 2. from 3. about 4. with	Choose the missing word. The sun seems to rise _____ each day. 1. early 2. more early 3. earlier 4. most early	Read the sentence fragment. Each penguin in the pool. Which is a complete sentence? 1. Each penguin in the deep pool. 2. Each and every penguin in the pool. 3. Each penguin in the pool swam. 4. Each little penguin in the deep pool.	Which sentence contains a double negative? 1. Ron is seldom late for a meeting. 2. You should hesitate before raising your voice. 3. The comedian didn't say nothing funny. 4. The cake can't bake in a cold oven.	Read the draft of Tala's paragraph. The tallest mountain in the world is Mount Everest at elevation is 29,029 feet. It was ascended in 1953 for the first time. Tala wants to combine these statements into one sentence. Which best combines these sentences? 1. The tallest mountain, at 29,029 feet, in the world is Mount Everest and it was first ascended in 1953. 2. The tallest mountain in the world, Mount Everest (29,029 feet elevation), first successfully was ascended in 1953. 3. Mount Everest, the tallest mountain in the world with an elevation of 29,029 feet, was ascended in 1953 for the first time. 4. First successfully ascended in 1953, the tallest mountain, Mount Everest, in the world has an elevation of 29, 029 feet.	Which sentence shows clear pronoun-antecedent agreement? 1. We unpacked our books from the boxes and then returned them to the office. 2. As soon as the monkeys left their cages, the janitors cleaned them. 3. If anybody wants to play professional basketball, you have to practice the fundamentals. 4. For English class, the students had to memorize a monologue by their favorite playwright.
Writing Conventions Students understand the conventions of punctuation, capitalization, and spelling.	Read the words. Do flowers bloom in the spring. Which mark(s) will punctuate the words correctly? 1. , 2. ; 3. , 4. ?	Read the sentence. My teacher gave the note to mrs. Beggs to take home. Which word needs a capital letter? 1. teacher 2. note 3. mrs. 4. home	Which word is always capitalized? 1. we 2. me 3. I 4. us	Identify the sentence that correctly uses quotation marks. 1. Mom said, "Go clean your room." 2. "What's that I asked?" 3. "Mr. Ramirez said, 'Get in the car.'" 4. "Did," I asked, "can I feed the fish?"	Which is the correct spelling for more than one berry? 1. beryes 2. beryes 3. berries 4. berys	Which sentence has the words capitalized correctly? 1. He said, "The Tide is Coming In." 2. He said, "The Tide is coming in." 3. He said, "The tide is coming in." 4. He said, "The tide is coming in."	Which sentence has the underlined word spelled correctly? 1. Sarah wore a <u>costums</u> for the school play. 2. The movie will <u>contunue</u> playing during recess. 3. The <u>parapic</u> of his speaking was formal. 4. I <u>disagree</u> the first time I went to the ocean.	Which sentence is punctuated correctly? 1. Pilar watch out for the bees in the garden. 2. It seems to us, Mr. Jones that the trip should be canceled. 3. What are you going to do after practice tonight? Don't! 4. If you ask me, Lorraine, this phone book is outdated.	Which group of words is spelled correctly? 1. phyology, provide, lege 2. isence, opposite, factory 3. sophistacted, detente, retrospect 4. truly, paradox, decoe

APPENDIX C. REVISED STUDY PROCESS QUESTIONNAIRE (R-SPQ-2F)

This questionnaire has a number of questions about your attitudes towards your studies and your usual way of studying.

There is no *right* way of studying. It depends on what suits your own style and the course you are studying. It is accordingly important that you answer each question as honestly as you can. If you think your answer to a question would depend on the subject being studied, give the answer that would apply to the subject(s) most important to you.

Please choose the *one* most appropriate response to each question and circle it the one that best fits your immediate reaction. Do not spend a long time on each item: your first reaction is probably the best one. Please answer each item.

Do not worry about projecting a good image. Your answers are CONFIDENTIAL.

Thank you for your cooperation.

1. I find that at times studying gives me a feeling of deep personal satisfaction.

Never/Rarely Sometimes Half the Time Frequently Always/Almost Always

2. I find that I have to do enough work on a topic so that I can form my own conclusions before I am satisfied.

Never/Rarely Sometimes Half the Time Frequently Always/Almost Always

3. My aim is to pass the course while doing as little work as possible.

Never/Rarely Sometimes Half the Time Frequently Always/Almost Always

4. I only study seriously what's given out in class or in the course outlines.

Never/Rarely Sometimes Half the Time Frequently Always/Almost Always

5. I feel that virtually any topic can be highly interesting once I get into it.

Never/Rarely Sometimes Half the Time Frequently Always/Almost Always

6. I find most new topics interesting and often spend extra time trying to obtain more information about them.

Never/Rarely Sometimes Half the Time Frequently Always/Almost Always

7. I do not find my course very interesting so I keep my work to the minimum.

Never/Rarely Sometimes Half the Time Frequently Always/Almost Always

8. I learn some things by rote, going over and over them until I know them by heart even if I do not understand them.

Never/Rarely Sometimes Half the Time Frequently Always/Almost Always

9. I find that studying academic topics can at times be as exciting as a good novel or movie.

Never/Rarely Sometimes Half the Time Frequently Always/Almost Always

10. I test myself on important topics until I understand them completely.

Never/Rarely Sometimes Half the Time Frequently Always/Almost Always

11. I find I can get by in most assessments by memorizing key sections rather than trying to understand them.

Never/Rarely Sometimes Half the Time Frequently Always/Almost Always

12. I generally restrict my study to what is specifically set as I think it is unnecessary to do anything extra.

Never/Rarely Sometimes Half the Time Frequently Always/Almost Always

13. I work hard at my studies because I find the material interesting.

Never/Rarely Sometimes Half the Time Frequently Always/Almost Always

14. I spend a lot of my free time finding out more about interesting topics, which have been discussed in different classes.

Never/Rarely Sometimes Half the Time Frequently Always/Almost Always

15. I find it is not helpful to study topics in depth. It confuses and wastes time, when all you need is a passing acquaintance with topics.

Never/Rarely Sometimes Half the Time Frequently Always/Almost Always

16. I believe that lecturers shouldn't expect students to spend significant amounts of time studying material everyone knows won't be examined.

Never/Rarely Sometimes Half the Time Frequently Always/Almost Always

17. I come to most classes with questions in mind that I want answering.

Never/Rarely Sometimes Half the Time Frequently Always/Almost Always

18. I make a point of looking at most of the suggested readings that go with the lectures.

Never/Rarely Sometimes Half the Time Frequently Always/Almost Always

19. I see no point in learning material, which is not likely to be in the examination.

Never/Rarely Sometimes Half the Time Frequently Always/Almost Always

20. I find the best way to pass examinations is to try to remember answers to likely questions.

Never/Rarely Sometimes Half the Time Frequently Always/Almost Always

Scoring for the R-SPQ-2F is in the following cyclical order (Biggs, 2001, p. 149):

1. Deep Motive, 2. Deep Strategy 3. Surface Motive, 4. Surface Strategy

5. “ etc.

APPENDIX D. STUDENT MOTIVATION QUESTIONNAIRE (SMOQ) FOR STUDY

Learning language arts using the traditional classroom approach has:

1. Made me love language arts	SD	D	U	A	SA
2. Made learning language arts frustrating	SD	D	U	A	SA
3. Been dull and boring	SD	D	U	A	SA
4. Made language arts more enjoyable	SD	D	U	A	SA
5. Highly motivated me to work hard in language arts	SD	D	U	A	SA
6. Helped me to discover skills in language arts	SD	D	U	A	SA

After learning language arts using the traditional classroom approach:

7. I find it hard to work independently	SD	D	U	A	SA
8. I expect to rarely be able to apply language arts in life situations	SD	D	U	A	SA
9. I do not expect to be successful in language arts tasks given by language arts teachers in the classrooms	SD	D	U	A	SA
10. I am now acquiring further knowledge of language arts	SD	D	U	A	SA
11. I can now study and solve problems in language arts on my own	SD	D	U	A	SA
12. I expect to perform well in other language arts areas	SD	D	U	A	SA
13. I am able to work independently in language arts exercises in and outside language arts classrooms	SD	D	U	A	SA
14. I expect to score highly in language arts tests	SD	D	U	A	SA
15. I expect to be able to apply language arts easily in other situations in life	SD	D	U	A	SA
16. I find learning language arts is in itself rewarding	SD	D	U	A	SA
17. I am now satisfied with the way I learn language arts	SD	D	U	A	SA
18. I no longer feel uneasy during language arts lessons	SD	D	U	A	SA
19. I am dissatisfied with my participation in classroom language arts activities	SD	D	U	A	SA
20. I was satisfied with the way language arts was taught in the classroom	SD	D	U	A	SA
21. I am now satisfied with my performance in language arts assignments and tests	SD	D	U	A	SA
22. I now found activities in language arts meaningful	SD	D	U	A	SA
23. I discover that language arts subject matter is related to my daily experiences	SD	D	U	A	SA
24. I realize that language arts gives opportunities for choice, responsibility, and inter-personal influence	SD	D	U	A	SA
25. Language arts lessons give me opportunities for cooperation and social interaction	SD	D	U	A	SA
26. I would like a career that does not require language arts	SD	D	U	A	SA

Question scoring:

Attention: 1, 2, 3, 7, 13, 14 (6 questions)

Relevance: 8, 15, 22, 23, 24, 25, 26 (7 questions)

Confidence: 6, 9, 10, 11, 12, 14, 18 (7 questions)

Satisfaction: 5, 16, 17, 19, 20, 21 (6 questions)

The following questions are reverse order questions: 3, 7, 8, 9, 19, 26

APPENDIX E. STUDENT MOTIVATION QUESTIONNAIRE (SMOQ) ORIGINAL

Learning physics using mastery learning approach has:

1. Made me love physics	SD	D	U	A	SA
2. Made learning physics frustrating	SD	D	U	A	SA
3. Been dull and boring	SD	D	U	A	SA
4. Made physics more enjoyable	SD	D	U	A	SA
5. Highly motivated me to work hard in physics	SD	D	U	A	SA
6. Helped me to discover skills in physics	SD	D	U	A	SA

After learning physics using the mastery learning approach:

7. I find it hard to work independently	SD	D	U	A	SA
8. I expect to rarely be able to apply physics in life situations	SD	D	U	A	SA
9. I do not expect to be successful in physics tasks given by physics teachers in the classrooms	SD	D	U	A	SA
10. I am now acquiring further knowledge of physics	SD	D	U	A	SA
11. I can now study and solve problems in language arts on my own	SD	D	U	A	SA
12. I expect to perform well in other physics areas	SD	D	U	A	SA
13. I am able to work independently in physics exercises in and outside physics classrooms	SD	D	U	A	SA
14. I expect to score highly in physics tests	SD	D	U	A	SA
15. I expect to be able to apply physics easily in other situations in life	SD	D	U	A	SA
16. I find learning physics is in itself rewarding	SD	D	U	A	SA
17. I am now satisfied with the way I learn physics	SD	D	U	A	SA
18. I no longer feel uneasy during physics lessons	SD	D	U	A	SA
19. I am dissatisfied with my participation in classroom physics activities	SD	D	U	A	SA
20. I was satisfied with the way physics was taught in the classroom	SD	D	U	A	SA
21. I am now satisfied with my performance in physics assignments and tests	SD	D	U	A	SA
22. I now aspire to study physics after KCSE	SD	D	U	A	SA
23. I am not sure whether I have the desire to continue studying Physics.	SD	D	U	A	SA
24. I now found activities in physics meaningful	SD	D	U	A	SA
25. I discover that physics subject matter is related to my daily experiences	SD	D	U	A	SA
26. I realize that physics gives opportunities for choice, responsibility, and inter-personal influence	SD	D	U	A	SA

27. Physics lessons give me opportunities for cooperation and social interaction	SD	D	U	A	SA
28. I would like a career that does not require physics	SD	D	U	A	SA

Note. Questions 22 and 23 were removed for the current study.

APPENDIX F. STUDENT ENGAGEMENT CHECKLIST

Student Engagement Checklist

Class Period _____ Date _____

Name	Engaged	Not Engaged	Comment